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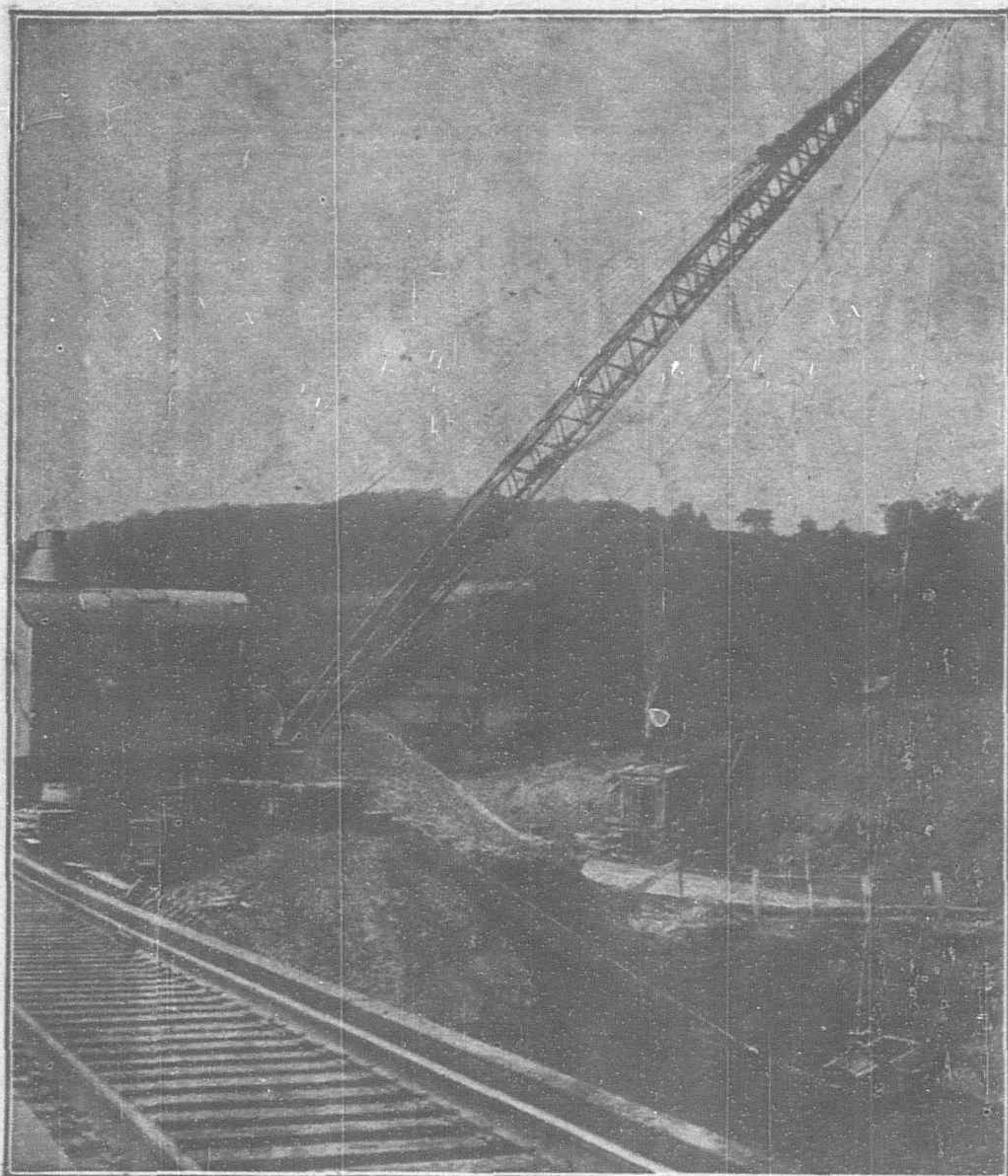
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Vol. XX

September, 1924

No. 9



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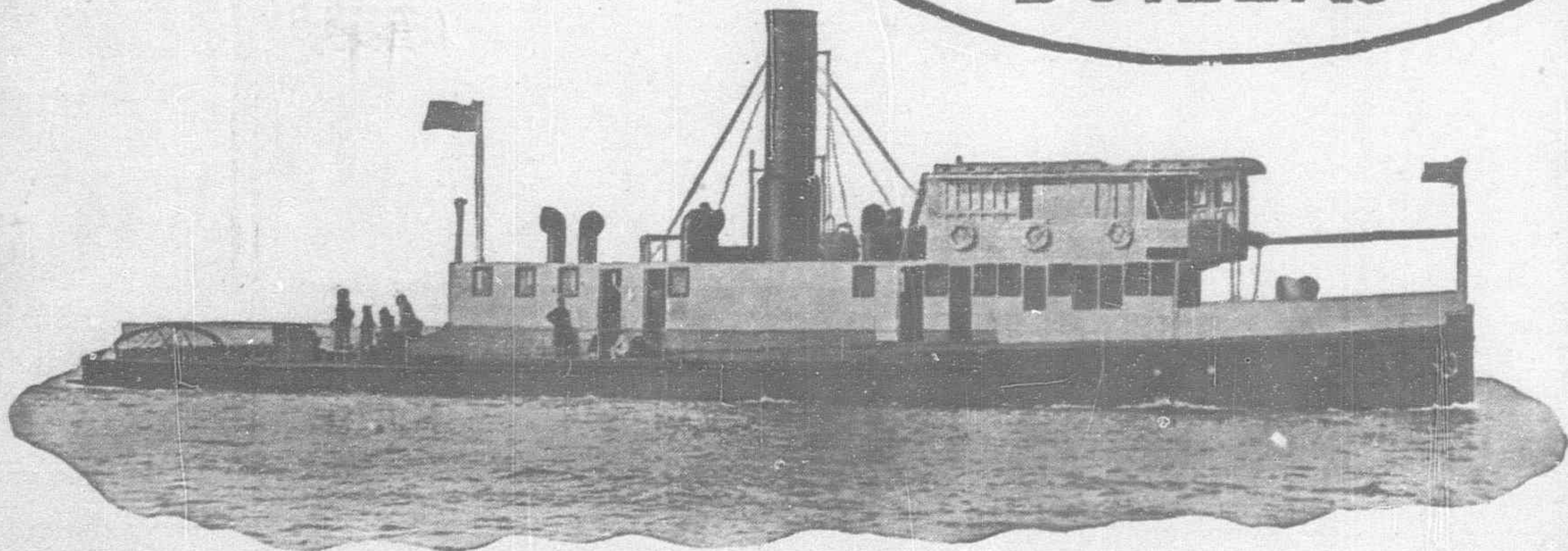
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Pressure of Population

Where Will America Expand?

A FEW years before his death, Admiral Peary predicted that by 1950 the southern boundary of the United States would be the Panama Canal. Now comes Admiral Rodgers and says the same thing in another way, by asserting before the Institute of Politics at Williamstown, that when the population of the United States reaches 200,000,000, it will be forced to wage war to maintain its place in the world. This frank expression of opinion was undoubtedly inspired by the prediction of Dr. Henry Pratt Fairchild before the institute that the population of the United States at its present rate of increase at the end of the 20th century would be 550,000,000. By 1950, the saturation point would be reached, and, according to Admiral Rodgers, Americans, deprived of those opportunities for development, which have moulded and determined their character and outlook on life, would demand their place in the sun.

Admiral Peary threw a bomb into the pacifist camp and shocked the sensibilities of Americans who fondly believe that under no circumstances will their country expand in the future at the expense of its neighbors. The statement of Admiral Rodgers also created a storm amongst the pacifist group at the institute who compared his speech to the utterances of militarists like von Tirpitz and others. Answering the argument of Dr. James T. Shotwell, professor of history at Columbia University, in support of the plans sponsored by the league of nations, which brands aggressive war as "international crime," Admiral Rodgers said he questioned whether the nations of the world were obsessed by an abhorrence of war, and then made the flat statement:

"I do not suppose that the United States will ever desire to make war against any country before our continental population passes 200,000,000," he said, "but after that, if there remains any manhood in our mixed race of descendants, we will surely go to war to keep our place in the world."

Here we have the opinion of the red-blooded fighting man who looks facts in the face and knows his own kind. We agree with Admiral Rodgers, and the late Admiral Peary. The United States now contains 114,000,000 people, and within the life time of the present generation or in another twenty-five years that number will be almost doubled. As the wonderful opportunities gradually disappear in America, and the pressure of population forces our young and adventurous sons to seek their future in surroundings which have contributed so much towards the making of the American character, they will overflow into Mexico and Central America. With 200,000 or more adventurous Americans settled in Mexico, the day will come when a situation will be precipitated, and in the same way that Texas became part of the union, in the same way that Hawaii was annexed and in the same way that we are now holding on to the Philippines, so will Mexico come under the control of the United States. American imperialism, however disguised behind altruistic policies, is not very far behind the imperialism of other strong nations.

The United States is now in political or economic control of Cuba, Haiti, Santo Domingo, Panama, Nicaragua, Honduras,

Salvador, Columbia, Ecuador, Peru, Bolivia, Guatemala, Costa Rico and Mexico.

In voicing a strong protest against this imperialistic tendency, Mr. Samuel Inman, speaking before the Institute on International Relations at Chatauqua, said that:

"Out of the twenty Latin American republics, half of them now have their financial policies directed by North Americans officially appointed. Six of these ten have the financial agents backed by American military forces on the ground. This includes Cuba, which has no official financial advisor, but General Crowder has so acted during recent financial readjustments.

"Four of the remaining half of these southern countries have their economic and fiscal life closely tied to the United States through large loans and concessions, which give special advantages to American capitalists. This leaves the six countries of Brazil, Argentina, Chile, Uruguay, Paraguay and Venezuela as the only ones outside the circle of North American financial control.

"Along with this economic and military dominance goes a dominance in the internal affairs of Latin America. In the Caribbean especially the word of the American minister is the most important factor for any government to consider. It is impossible for any one who has not come into close contacts with these countries to realize how completely their governments are held in the hollow of the hand of the state department at Washington.

"No one objects to North Americans doing business with Latin America or making loans to them, so long as the dealings are honestly carried on and government machinery, paid for by all the people, is not used for the protection of individual (private) property or for dictating the internal policies of a friendly nation. In the present economic age the United States and the nearby Latin American countries must necessarily have close relations. Latin America needs the concentrated capital of this country to help them develop their natural resources. We need the oil, the sugar, the bananas and other products of Latin America to feed our people and our factories.

"But the business of having our battleships trailing around after our bankers, our diplomats doing the bidding of our oil kings, and the whole power and prestige of this great democracy used to discredit its people, by jamming down the throats of a weak people constitutions, treaties, and agreements which only the bayonets of the marines make them accept—this is the business that makes a red-blooded American's blood boil, as he sees it while traveling in the Caribbean these days.

"Corrupt officials in Latin America are often willing to accept a 'rake-off' for an unusually good concession to the foreigner. Or loans at an exorbitant figure, pledging the resources of the country that ought to be sacred, are made by a government to keep itself in power. These loans, often against the wishes of the people, are floated at the instance of foreign bankers to make improvements which are all right in themselves but which poor countries had better deprive themselves of rather than to mortgage their future. The people of Salvador and Bolivia have strenuously opposed for years the loans which were finally consummated by selfish officials and insistent bankers.

"Another matter to clarify is that the frequent revolutions in Latin American countries are as often fostered by outside influences as by native inability for self-government. Revolutions in Mexico and Central America have been so often fostered by North American concession hunters that in a revolution like the recent one in Honduras, foreign ramifications are very likely to be suspected, even if none appear on the surface.

"The continuance of this dollar diplomacy means the destruction of our nation just as sure as it meant the destruction of Egypt and Rome and Germany and all the other nations who came to measure their greatness by their material possessions rather than their passion for justice and by the number of their friendly neighbors. Some day the worm will turn. Burdens like we are pushing on these weak neighbors will cause them and whatever friends they can find to turn against us."

Here we have all the symptoms of peaceful penetration which world history tells us are simply the preliminary steps towards the ultimate annexation of a weak country by a stronger neighbor. The argument is reinforced when we turn to our attention to

American tendencies in the Orient. Go to Manila and advocate the fulfillment of our national pledges to concede independence to the Philippine Islands or urge in any way that our control be surrendered, and the resident Americans probably would hustle the daring orator down to the end of Pier VII and drop him into the waters of Manila Bay with the admonition to swim back home.

The same state of mind can be seen amongst Americans in China, who labor under the hallucination that in some way this country is under the sole protection of the United States, that it is our heaven-sent obligation to intervene in its affairs single handed and remodel its government and finances along American lines under the direction of American advisers.

This tendency to seek outlets for an increasing population and hold the allegiance of the emigrant is a constant provocation for future wars, and if the predictions of Dr. Henry Pratt Fairchild come true, universal peace is merely a dream of the pacifists. Dr. Fairchild predicted that the United States by the year 2050 will have a population equal to that of the entire world to-day, in other words, he invites attention to a problem that will confront the United States—which can be solved only by an aggressive war, in the event Americans refuse to foreswear their allegiance when they change their residence.

While far-sighted Americans are looking ahead to the day when national expansion will become necessary and are advocating an armed peace to protect the country against the possible aggression of other less fortunate peoples, Japan silently accepts the verdict of the western world and is seeking an outlet for her surplus millions in such lands as yet remain open to them. A new commission headed by the minister of foreign affairs has been created by the Japanese government to make an exhaustive study of the emigration problem and report on the best places in the world suitable for colonization. The initial meeting of this commission took place recently in Tokyo and although it is too early to anticipate its final report, there is reason to believe that it will favor the emigration of Japanese to South American countries rather than Manchuria, Mongolia or Siberia. Economic conditions in these territories which prohibit Japanese competition with the native laborer and farmer, the rigorous climate and the existence of extra territorial principles within Chinese territory, will undoubtedly influence the commission to approve of an outlet in South America.

The empire, although self-supporting is over-populated, undernourished, unorganized and poorly equipped to meet the competition of the west. Sixty per cent. of Japan's labor is engaged in agriculture and until a higher standard of efficiency is attained in her manufacturing methods, there is little hope that her surplus population can be absorbed into industries. Japan is up against one of the hardest problems that ever confronted any nation in the history of the world, and she is doing her best to overcome her difficulties through peaceful and legitimate methods. That Mexico, Central and South America will be called upon to receive her surplus, seems a foregone conclusion.

Mexico is already extending a welcome to Japanese immigrants and there is reason to believe as time goes on, the Japanese will favor this country as an outlet above the other Latin American states. Now it is a foregone conclusion that every Japanese who settles in Mexico will absorb the natural enmity of the Mexicans for their "Gringo" neighbor. Add to this the national rancor against America held by the average Japanese and it is easy to foresee the trouble this combination can make for the United States, especially when Americans are forced to seek their outlet in the same territory.

Commenting on this probable development, the *Natchez Democrat* asks:

"To what extent is this Asiatic colonization scheme in Mexico going to trench upon the Monroe doctrine? How far could we permit it to proceed without endangering an established sovereignty on our southern border? To what extent would Japanese dominance in Mexico endanger our own safety? To what extent are the Japanese protected in this Mexican enterprise by the terms of the four power treaty? Under that treaty, would we be compelled to submit the Monroe doctrine, in case of a difference of opinion between the United States and Japan, to Great Britain and France, the other two powers in this Pacific pact?"

"These are large questions."

Yes, these are large questions and if the trend of Japanese immigration is towards that part of America south of the Rio Grande, and they arrive there in large numbers before the inevitable influx of Americans, it is not very difficult to visualize the future. The future of the immigration or racial problem is far from rosy.

Quo Vadis

The Penalty of Isolating Japan

EVER since the Washington conference, Americans, Japanese, and British have been busily seeking to find out which nation "did" the other two, says the *Minneapolis Tribune*. A number of American writers have set out to prove that the Americans were taken in by the Japanese. A number of other American writers have set out to prove that the Americans were taken in by the British. Japanese writers on the other hand, have sought to show that the Japanese were taken in by the Americans while British writers have sought to show that the British were taken in by the Americans. It is always natural for a given national to suspect that his own nation is fleeced. The opinions of a neutral outsider, therefore, possess a real interest. The German Admiral Holman, writing on "Sea Power and World Politics," states bluntly his conclusion that Japan got the worst and Britain the best of the Washington bargain.

"As a result," says Holman, "England left the conference mistress of the seas, especially when we consider her advantage over the United States—obliged to defend a long coast-line on two oceans—her naval bases strategically placed over the whole globe, her long maritime tradition, and the greater efficiency and better quality of her fleet. Japan's naval status was further impaired by the restoration of Shantung to China, and by her engagement not to fortify her outer islands—as an equivalent for which the United States agreed not to fortify any islands in the Pacific except Hawaii. Last of all, a final setback was given to Japan's ambitions by the substitution of the meaningless four-power treaty for the really significant Anglo-Japanese alliance. By this treaty the United States, England, Japan, and France formally agreed to settle all controversial questions relating to their common interests in the Pacific by public negotiations, and to act together in defending those interests from outside attack. Whether they anticipated such attack from the Bolshevik navy, the Mexican, or the Polish navy, has never been clear to me. Thus the Washington conference resulted in a complete surrender of Japan to the Anglo-Saxons."

Holman's opinion is in complete harmony with our own, supporting our contention that the one weak spot in the Washington treaties was the failure to provide Japan with some compensating advantage for the surrender of the defensive pact with Great Britain which owed its origin to forces menacing their mutual interests in Asia. As it is, Japan has been stripped of all strategic advantages acquired as the result of twenty years of unremitting vigilance and sagacious diplomacy, deprived of support from Great Britain against her traditional Asiatic foe and left in an isolated position to face her future without any guarantees that her western associates will come to her assistance in the event her vital interests are again placed in jeopardy.

It is just this situation which provides American strategists with the arguments to support their plea for greater military preparedness. Japan's isolation in Asia may well lead to recognition of the Soviet followed by closer relations that may develop into some understanding defining their respective rights and positions in Eastern Asia. For the present the Japanese statesmen directing the policies of the empire strongly favor at any whatever sacrifice the closest relations with America, but on the other hand there is an equally influential element which advocates a renewal of the old understanding with Russia. The whirligig of politics may bring this element into power in some of the frequent cabinet changes and compromise the future policies of the empire along lines that will cause uneasiness to other powers.

At the head of the pro-Russian group stands Viscount Goto, one of Japan's foremost statesmen and administrators, who bases his plea for a closer understanding with the Soviet on clear cut economic arguments arising out of the population problem. He does not dread free intercourse or closer contact with the Bolsheviks but comes to the point and says that the prevention of dangerous thoughts and labor unrest in Japan depends entirely on the solution of the population and food problems. He says that if the population continues to increase at its present rate without a corresponding increase in the food supply a terrible disaster is bound to follow. The pressure of population on the national food supply will compel the people to fight for food by appealing to brute force. The future of Japan in his opinion depends on the further and more perfect industrialization which will enable the national economy

to support a greater population, obtaining food from foreign countries in exchange for exported manufactured products. This, he says, is the key to the solution and nothing else and to enable Japan to expand her industries the closest relations with Russia are imperative to obtain much needed raw materials and furnish a market for the manufactured articles. Close relations with Russia means in the last analysis close relations with Germany. It means a new line-up in which Japan's economic sphere in Manchuria and Mongolia will not be imperilled by any aggressive move on the part of Russia, a line-up somewhat at variance with the policies of the other western powers with whom Japan is now in such accord. Any further attempt to close the doors of American countries to Japanese immigration, a possibility that must be faced if they seek homes in large numbers in that part of the world, can only tend to throw Japan into the arms of Russia and Germany.

The problem becomes more and more complicated when it is seen that Viscount Goto's remedy is one extremely difficult to put into practice. For the present, Japanese manufacturers are unable to hold their domestic market against foreign competition owing to the high costs of labor and manufacture. Only by a radical return to a pre-war scale of wages and improvements all along the line in manufacturing methods can Japan lower her costs and hope to compete for foreign markets with the rest of the world. Until this revolution in existing economic conditions takes place, Viscount Goto's plan will hardly help to solve Japan's difficulties. In the meantime, the population keeps mounting up and there is no place for them to go in large numbers except South America or Asiatic Russia.

Undoubtedly it is this complex situation which influenced Major-General Harbord, former deputy chief of staff of the American army, to point out at a recent Chautauqua meeting that the "Colonial future of Great Britain, France, Holland and Japan, may most vitally affect the United States. Not all the great powers were parties to the Washington conference. China, Russia and Germany are politically in an uncertain state. Giants are stirring restlessly in their slumbers and may be dreaming dreams.

"Our unhappy manner of doing a thing we had a right to do may have lost us the warm friendship of Japan. Russia and Germany will not remain content excluded from the Far East. Japan has grievances, real and fancied.

"What would a German-Russian-Chinese-Japanese combination do to the peace of the world? What could withstand a union of white, yellow and brown gathered from the Rhine to the China Sea, and what is there impossible or even unlikely in such an alliance?

"With all the Latin-American States in the league of nations, can we maintain the Monroe doctrine with these countries south of us carrying their disputes before that political organization for settlement?"

To which we add, especially if our Asiatic exclusion policy and the recommendation of Japan's emigration commission forces the Japanese surplus into Mexico and other states of Latin America. In the event that some South America government enacts an exclusion law or enforces legislation depriving Japanese colonists of their lands after developing them to a high state of productivity, will the United States forego its conception of the Monroe doctrine and permit the dispute to be settled by an international court or the league of nations? In the event that 200,000 or more Japanese settle in Mexico or some other country to the south of the United States where their presence precipitates some situation that would demand the intervention of the Japanese government, would America invoke the Monroe doctrine and warn Japan to keep her hands off? If, at every turn Japan is confronted with the antagonistic policies of the United States in her peaceful efforts to find an outlet for her people, would she not be justified in linking her fortunes with the combination of powers mentioned by General Harbord? Time alone will tell, but as General Harbord wisely points out—what is there impossible in such a line-up?

* * *

Luxury or Life

AS might be expected a certain section of the American, British and Chinese press has assumed a belligerent attitude over the new Japanese tariff which places a duty of 100 per cent. *ad valorem* upon luxuries. Some of the more rabid Journals even go so far as to say that this was the real boycott of American goods which some of the ardent Japanese had threatened to invoke, a boycott made efficient by government rather than private action. The latter argument can be disposed of without difficulty in view of the protest from certain British quarters, notably the federation of

British industries, to the board of trade, which complains that British trade will be hampered and exports of some products that enjoyed quite a sale in Japan will be forced to drop out of the manifests of steamers bound for Nippon. Therefore it would appear that no nation is especially hit by this luxury tariff, but that all suffer equally, the Japanese themselves being hardest but since those who have come to depend on imported goods of the "luxury" classification, must find some home-made substitute or go without.

But the matter goes far deeper than the superficial view of the countries principally affected. The Japanese standpoint must be considered first and foremost. For many months, ever since the great disaster of last year, Japanese statesmen have been noting with concern the rapidly increasing adverse trade balance. Despite the rise in price of silk, Japan's greatest export item in her trade with America, the falling off in volume in this product has been astounding, due to decreased demand by United States weavers of silk textiles. Coupled with this decrease has come the enormous demand for materials with which to rebuild the shattered cities in the quake and fire zone, so that Japan has been caught, as it were, in the pincers of a giant claw—and both mandibles hurt. It is impossible for Japan to force her silk on a declining market, better wait a bit until the demand nears normal again, and it is just as impossible for Japan to stop buying the iron and steel and wood and other structural material needed to rehabilitate her cities and help her millions to return to normal industrial life.

Japanese statesmen have been trying for years to drive home to their people that they must become a great industrial nation so that the factories may provide sustenance for those whom the fields are not wide enough to support. This idea has been intensified since the disaster and the leaders of national thought were not slow to see an added argument in the boycott of foreign goods that was mooted after the passage of the exclusion act by the United States congress. The luxury tariff was not born then, but it came to a focus due to concentration in the two lenses—that of adverse trade balance and a "buy Japanese products first" movement that was a logical outcome of the collapsed boycott. This was entirely reasonable and while some Japanese and practically all foreigners in Japan chafe under it, the outcome doubtless will be a speeding up of Japanese industry such as the nation has not seen since the early days of the war.

Historically considered, Japan's anti-luxury tariff has a noteworthy precedent, that of Sparta where they went so far as to make their money of iron so that no one could carry much of it. Sparta's object also was two-fold. In her case she feared effeminacy due to the example of Athens and a corresponding lowering of her military power. Also she needed, just as does Japan, to conserve her resources not because of a past calamity, but to avert calamities that cast gloomy shadows of forboding over the souls of Lysurgus and Draco. As a matter of fact, Japan's fears are along neither of those lines although luxury from a western standpoint is rather a recent growth in Japan, yet it doubtless received a great stimulus from those *nairikin*, the new-rich of war prosperity, so that there may have been an idea in the back of the minds of the framers of this luxury tariff, that a return to former simple standards of living would not be a bad thing for the nation as a whole. That this was not the principal or even one of the prominent objects of the tariff law is quite evident in that Japan makes many of the so-called foreign luxuries herself and the expansion of these native industries, by keeping considerable sums at home that have been spent abroad, will augment considerably the internal prosperity of the country and increase its revenues to an extent that will enable the absolute necessities to be bought from abroad without pinching or lessening the national credit.

But that laudable ambition on the part of the Japanese does not lessen the discomfort with which certain manufacturers of other nations view the new enactment. "Unequal treatment of various nationals" is charged against Japan by the general chamber of commerce of Shanghai which calls upon the foreign office to lodge protest with Japan against the immediate enforcement of the new luxury tax as regards Chinese products, while a bathering space has been granted certain western nations.

The telegram reads: "Recently the tax on luxuries in Japan was increased, and while the Japanese government promised several countries, including Great Britain, Germany and Belgium, to postpone its enforcement, nevertheless the tax is collectable at once on Chinese goods. Thus their policy of pleasing the strong and abusing the weak is obvious to all.

"If this unfair treatment be not cancelled, how can Chinese merchants trade in that country? If the government authorities do not protest, how can it be called the protector of its merchants? Moreover, this changing of taxation is quite contrary to the principles of the Washington conference. The different institutions in Shanghai when hearing this news are greatly agitated.

"It is well understood that on one side, Japan is puffing its friendly policy toward the Chinese but on the other is trying to abuse the Chinese residents or merchants there with the utmost effort. All the cruel laws and harsh regulations are being tried out on the Chinese. In this recent increase of the luxury tax, hundreds of kinds of goods are included. If this be enforced, how can Chinese merchants trade in that country?"

Other nations object, not quite so ingenuously perhaps, but all seem to think their own national toes are trampled upon, refusing to see the plain truth that Japan would curb her luxury loving population and make them keep their money at home.

* * *

Japan On the War Path

As Seen from the Eiffel Tower

PARIS has recently become the distributing centre for disquieting news about Japanese policies and preparations for war and we are beginning to get an accurate line on the origin of much of the anti-Japanese publicity manufactured and spread broadcast by international news services whose effect can only help to make Americans skeptical about Japan's intentions in the Pacific. Two months ago we were regaled with the oily story originating in Paris of the existence of an alleged secret understanding between Japan and Russia in which the former was to furnish the Soviet with its old war-ships together with huge quantities of artillery and ammunition in exchange for oil concessions in Saghalien that would assure to the Japanese navy an independent fuel supply. The inference behind the canard was that Japan considered the menace from the sea more urgent than the menace from the direction of Urga. Although this story was immediately denied from Moscow it was resurrected a month later by a British news-service and broadcasted, this time receiving an unqualified denial from Tokyo.

Shortly after we were informed by the *Westminster Gazette* that Japan had purchased 140,000 machine guns from Vickers, whose plant was working day and night to rush through the order. This also was immediately and officially denied from Tokyo. Before this story had time to cool the *Paris Temps* of August 6 published the news that

"There are being built in Italy a number of bombing planes of a German type for the account of the Japanese navy.

"These machines are entirely metal. They have a range which will permit them to fly from Japan to the Philippines and back, carrying a ton of explosives on each.

"The company which is building them, Staloria di Construzione, at Marina di Pisaqui, appears to be a branch of the Dornier Metallbauten Corporation of Friedrichshafen. Furthermore, the Mitsubishi Company of Kobe is said to have bought the rights and patents of the German Dornier firm."

Here we are permitted to glimpse something of the real object behind this continued propaganda. Note that the range of the planes is not given in miles, but emphasizes that they can fly from Japan to the Philippines and back. Now there is nothing alarming about Japan's aerial program nor should there be anything significant in the fact that she is ordering planes from abroad or until such time as she can manufacture them in her own establishments. Nor is there anything remarkable in the fact that these planes should be models to be brought to Japan for the Mitsubishi Works at Nagoya. But the mere fact that Japan is ordering planes in Europe, built to a German model, becomes an international news sensation while news of shipments of French fighting machines to China for the use of the various war-lords is soft-pedalled. Several correspondents of American newspapers in Paris seized on the story of Japan's purchases of planes in Europe to indicate that she is building up a huge air force, which in connection with the other stories released in Paris and London about her war-like preparations are sufficient to keep the American public alarmed and provide excuses for American militarists to urge larger appropria-

tions for defense. If Japan builds a few cruisers or submarines there are experts galore to accuse her of violating the provisions of the disarmament agreement and now that that story is squashed, behold her ordering machine guns by the hundreds of thousands and outdistancing her competitors in the air.

The aircraft story as told by the Paris correspondent of the *Chicago Tribune* who witnessed the flights in Italy is to the effect that "Bombing seaplanes of German design are being built in Italy for the Japanese navy. They are all metal machines, the latest word in military flying boats, and have a fuel radius and bomb-carrying capacity which would enable them to carry a ton of explosives from the nearest Japanese base to Manila and return.

"I have just spent two weeks in Italy observing the flying boats in the process of construction. All are equipped with bomb racks. Dozens of German and Italian mechanics are employed at this work in the shops and hangars of a large Italian aeroplane company at Pisa, while German test pilots are making trial flights over the Mediterranean.

"The Italian company is a child of the Dornier Metallbauten corporation of Friedrichshafen, which is one of the Zeppelin producing plants. The German company at present is engaged in Germany in constructing the ZR-3 airship for the American navy. The interallied air control mission, which under the Versailles treaty prevents the construction of possible war machines in Germany, is responsible for the establishment and operation of the extensive plant in Italy, but in spite of this arrangement the aeroplane parts are manufactured in Germany.

"The information was admitted at Pisa that the manufacturing rights of Japan for all Dornier machines and inventions have been purchased by the Mitsubishi ship building works of Kobe, whose former extensive business of battleship construction for the Japanese government has suffered a depression through the terms of the Washington conference.

"The purchase figures are reported to be high in millions of yen. The transaction was consummated on May 10, at which time several Japanese naval officials spent two weeks at the Pisa plant, leaving one of their number, who now is overseeing the work.

"Three German experts from the Pisa factory left immediately for Kobe to superintend the erection of a manufacturing plant there. They were Fritz Bauer, factory superintendent at Pisa and a former Zeppelin official; Hans Berger, shop foreman and metal expert, and Herman Klinger, chief of the supply and assembling department.

The Paris correspondent of *The New York World*, however, got the story from French sources and learns that large orders lately have been placed with Farman for airplanes, including at least ten Goliaths—machines which carry three tons and which could fly from Paris to Morocco between sunrise and sunset.

A French military and technical mission, he says, has just returned from Japan, where it organized flying schools, factories and airdromes. Other French manufacturers have received orders from the Japanese government. The total number of machines runs into hundreds. A Japanese air mission is shortly expected in France. Already three European centres for air research have been established by Japan—in France, Germany and Italy. Recently Japan ordered three giant Capronis, the largest existing type of airplane, carrying four engines and a large number of passengers."

All this is probably true as is also the fact that Japan is keenly alive to the progress being made in the development of aviation and seems determined to become independent of foreign manufacturers by establishing her own workshops. Following out this idea the Japanese papers report the proposal of a merger of the naval construction department in the Hiroshima arsenal with the Kure naval arsenal, the combined workshop to be used as an independent factory for the manufacture of airplanes.

The conversion of the Yoyogi parade ground in Tokyo into an international aviation field, and the establishment of landing fields in Osaka and other leading cities of the nation, also are under consideration.

It would seem as though Japan was trying to keep in step with the rest of the world in aviation and that her efforts along these lines would be welcomed as a boon of progress instead of a war menace. When the Japanese see the military fliers of other nations passing over their country and war-planes of all kinds and from all countries pouring into China and foreign pilots entering the service of the various warlords it certainly behooves Japan to grow wings of her own.

Another Secret Alliance

Roosevelt's Adherence to the Anglo-Japanese Pact to Maintain the Peace of the Far East.

Why did Taft Reverse Roosevelt's Policy?

WHAT are the duties of a journalist? On September 12, I sat as an invited guest at a dinner tendered by the international journalists' association of Tokyo to Japan's new minister of foreign affairs, Baron Shidehara. In presenting the distinguished guest, Mr. Zumoto, the veteran editor of Japan, mentioned that some day in the future when the inside history of the Washington conference is written, it would be found that much of its success was due to the pre-convention labors of Japan's delegate whose intimate contact with Secretary Hughes and sympathetic understanding of his aims paved the way for the official acceptance of the basic ideas of the conference. Baron Shidehara then addressed the gathering on the duty of the press to inform the public correctly about political events. He stressed the part publicity bears towards diplomacy and international relations and how public opinion is made on the strength of what is printed in the newspapers. It was an excellent talk, but the thought came to us that it will ever be an impossibility for the journalist to live up to the high standards set for him so long as diplomats and public officials withhold vital information essential to an intelligent understanding of current events. Newspapermen are rarely permitted to peep behind the scenes of high politics and must accept the facts as doled out to them by statesmen interested in giving publicity to their own views and doings. The whole truth is rarely told and only in after years when the memoirs or private papers of some statesman are published are vital facts released, too late to have any influence in moulding public opinion of the day and interesting only to the historian. Mr. Zumoto's reference to the part played by Baron Shidehara at Washington seemed to be a case in point and tells us that not until the inside history of that memorable conference is written will the world know all the facts that led up to its invocation. With these thoughts fresh in our mind we received the following day the newspaper reports of a session of the Institute of Politics at Williamstown in which Dr. Tyler Dennett told the China Round Table that Theodore Roosevelt while president had entered into a secret compact with Japan for the maintenance of Far Eastern peace.

The "agreed memorandum," as Dr. Dennett called a document which he said had been "enthusiastically endorsed" by the President after being drawn up by representatives of Mr. Roosevelt and the Japanese government, also contained a statement that Japan had no intention of trying to take the Philippines away from the United States, and that Mr. Roosevelt's representatives declared that Japan would be justified in establishing a military protectorate over Korea and taking charge of her foreign affairs.

Dr. Dennett also asserted that he had seen a "brief letter" written by President Roosevelt at the outbreak of the Russo-Japanese war, in which Mr. Roosevelt warned both France and Germany that if they went to the support of Russia, he would go to the support of Japan. In consequence of these two actions by the President, Dr. Dennett went on, the United States during the Roosevelt Administration, was virtually "an unsigned member of the first and second Anglo-Japanese alliances." According to Dr. Dennett, President Roosevelt prevented a world war by his warning to France and Germany.

The Dennett revelations created a sensation among the members of the institute. In a discussion following the address, Dr. Dennett was hailed on one hand as the discoverer of new historical facts of far-reaching importance, while on the other hand he was challenged to produce proof of his assertions. Dr. Dennett replied that he had been working on President Roosevelt's private correspondence for months, and that the documents he referred to were on file in the possession of the Roosevelt family. He said that he had in his possession a photostatic copy of the "agreed memorandum" made on July 29, 1905, the effect of which was to place the United States during the period of the Roosevelt Administration as almost an unsigned member of the second Anglo-

Japanese alliance. This agreement took the form of 'an agreed memorandum,' and had the complete endorsement of President Roosevelt. Although it was negotiated through regular diplomatic channels or by a member of the Department of State, the substance of this agreement was as follows:

"In the course of the conversation the American representative of President Roosevelt remarked to the Japanese, 'I suppose that you do not desire to take the Philippine Islands away from us.' The Japanese replied that he was glad to assure the American government that Japan had no such desire or intention, and that Japan would be best satisfied to see the United States remain in the Philippines and establish and maintain a stable government.

"The Japanese representative then said in substance: 'You realize how difficult it is to preserve the peace of the Far East. There is danger that following the conclusion of the Russo-Japanese war, Korea will lapse again into a condition of anarchy. We are aware of the provision of the American constitution which make alliances so difficult, but it seems to us as though it would be possible for the United States to enter into a secret agreement with Japan and England for the preservation of the peace of the Far East.'

"The American replied that under our constitution such a secret agreement would be impossible. However, he thought he could assure the Japanese government that the American people would be glad to act with the Japanese and British people for the preservation of the peace of the Far East.

"The Japanese representative then inquired of the American representative what, in his opinion, Japan should do with reference to Korea. The American replied that in his judgment Japan would be fully justified in establishing a military protectorate over Korea and in taking charge of her foreign relations.

"This document was approved by President Roosevelt only twelve days before the formal publication of the terms of the second Anglo-Japanese alliance, and two weeks before the opening of the Portsmouth Peace Conference. This action of President Roosevelt did not stand alone.

"At the outbreak of the Russo-Japanese war, eighteen months before, President Roosevelt had been so impressed with the possibility that France or Germany, or both, might go to the support of Russia against Japan that, according to his own statement, in a brief letter which I have seen, he warned both Germany and France that if they went to the support of Russia he would go to the support of Japan and 'take whatever steps necessary for her protection.'

"It will be recalled that in the first Anglo-Japanese alliance, signed in 1902, this was the obligation which had been assumed by England. We may, therefore, say that this warning, which came personally from President Roosevelt to France and Germany, had only the value which attaches to the personal declaration of the President of the United States. Nevertheless, the effect of it was to make the United States assume substantially the same responsibility toward Japan which England had assumed in the first alliance.

"Putting together these two actions of President Roosevelt, we may see roughly that the United States during Roosevelt's administration was, so far as the action of the President could make it, an unsigned member of both first and second Anglo-Japanese alliances. The obligation was, of course, not binding on other administrations and was in fact ignored by President Taft and Secretary Knox in the proposal for the neutralization of the Manchurian railways in 1910.

"This action on the part of President Roosevelt would appear to have very great significance in any study of recent foreign policy of the United States. President Roosevelt was perhaps the first American statesman, certainly the first since Seward, to perceive clearly that the Far East question is largely a phase of European politics.

The Russo-Japanese war had its origin quite as much in Europe as in the East. President Roosevelt appears to have realized that the most certain way to safeguard American interests in the Far East was to enter European policies and declare American willingness to bear its full share of responsibility for the preservation of the peace, not merely of the Far East, but of Europe and the world.

"At the beginning of 1904, as is clearly revealed in the private papers of President Roosevelt, as well as in the contemporary literature of the time, Europe was dangerously close to the brink of a world war. France was allied to Russia, England was allied to Japan. Four powers were paired. Germany had urged Russia into the war with Japan, and her future policy was then a matter of doubt and grave concern.

"When President Roosevelt threw in the weight of his influence by his warning to France and Germany, he localized the conflict in the Far East and quite possibly prevented the outbreak of a European conflict. It would therefore appear that the policy of co-operation with foreign relations in international affairs cannot be called a partisan policy. It is one which has been as ardently advocated by Republican as by Democratic leaders.

"Indeed, we may wonder whether in years to come it will not be regarded as Roosevelt's greatest contribution to American statesmanship that he so perceived the necessity of American participation in European politics. The situation in the summer of 1905 is such as to make it seem quite plausible that if President Roosevelt had not made this engagement with Japan and England it would have been far more difficult and perhaps impossible for him to mediate the peace of Portsmouth a month later."

Dr. Dennett's statements were corroborated the following day by Dr. Charles Moore, life-long friend of the former president and now custodian of the Roosevelt collection of papers and letters. So here we have another belated contribution to Far Eastern history permitted to leak out informally twenty years after the event. Count Witte's memoirs and the frequent references to the secret Sino-Russian treaty of alliance in the pages of this magazine probably influenced the Chinese delegation to break the seal of official secrecy surrounding this instrument and file a summary of its text with the Washington conference. The facts surrounding that treaty and its bearing on subsequent events completely reverses the accepted version of modern Far Eastern history and this new revelation of secret American diplomacy taken in connection with other belated facts will further help to straighten out the tangled skein of misinformation that has for so many years befuddled the minds of Far Eastern journalists.

It seems improbable that such a firm attitude on the part of Roosevelt towards Far Eastern affairs was concealed from his cabinet, especially his secretary of war, and the question is bound to arise why the latter as his successor, reversed his policy. Some day, perhaps long after his demise, the papers of President Taft may shed light on this highly interesting question and until such time the historian can only fill in the gaps and draw deductions from existing state papers and the letters of Willard Straight. The complete reversal of Roosevelt's friendly policy towards Japan by his successor in office would seem to call for an explanation on the part of Mr. Taft, for until he clarifies the situation, the student of Far Eastern history basing his impressions on Straight's revelations must incline to the belief that America's sudden change of front was influenced by Harriman's determination to gain control of the South Manchuria Railway, using the power of the state department to achieve what he could not accomplish by open and private negotiation. The cold, hard facts surrounding the origins of American policies in Manchuria and our hostility towards Japan dates from the Russo-Japanese post-war period having its inception in the Manchurian negotiations between Willard Straight and Tang Shao-yi. The policy of Roosevelt was reversed and from being an ally and ardent supporter of the Anglo-Japanese understanding we swung around and became over night a bitter political antagonist. There must be some excellent explanation to account for this sudden change and until Mr. Taft takes the nation into his confidence, the impression will remain that the change was ushered in with the "dollar diplomacy" of Secretary Knox.

Coming back to the subject matter of Baron Shidehara's address, it is difficult to see how the journalist can hope to mould public opinion when such vital facts are concealed from him by the operation of secret diplomacy. As a consequence of policies whose origins remain hidden, America and Japan drifted apart

until actual war stared the two countries in the face, taxing the ingenuity of the diplomats of each country to find an amicable solution of their difficulties. Having found such a solution they take the credit for it and censure the newspapers for having created the misunderstanding.

It is brought home to us that in so far as Far Eastern affairs are concerned much of the present bitterness of feeling could have been avoided had the diplomats taken the journalists into their confidence instead of using them to advance their own plans and give publicity to their idea of what constituted national interests. Even at this late date a little more confidence in the press in matters concerning Far Eastern affairs would materially assist in clarifying the international political atmosphere and make for better relations. It is to be hoped that we will not have to wait another twenty years before our grandchildren are informed of facts which have a direct and vital interest for the present generation.

G. B. R.

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American-Japanese Co-operation

The Industrial Bank of Japan Obtains a Loan of \$22,000,000 in New York

ONE of the most interesting and significant international financial transactions of the past year was the successful flotation by the National City Company of New York of a loan to the amount of \$22,000,000 to the Industrial Bank of Japan, Ltd., for the general purposes of the bank's business. The notes are dated August 15, 1924 and mature in August 15, 1927, redeemable in whole or in part at par and interest on thirty days notice beginning August 15, 1926. They carry interest at six per cent. and were offered to the public by the National City Company at 99 $\frac{3}{4}$ to yield more than 6.27 per cent. The whole issue was oversubscribed within twenty-four hours after the subscription books were opened.

Coming so soon after the successful flotation of the \$30,000,000 loan for the Daido Electric Power Company and the previous issue of \$10,000,000 for the Oriental Development Company, the transaction indicates that American bankers and investors have the fullest confidence in Japan's economic condition and reject the arguments advanced to obstruct closer financial relations between the two countries.

The Industrial Bank issue is of special importance as it bears the unconditional guarantee of the Imperial Japanese government as to principal and interest by endorsement on each note and the further guarantee that the notes will be payable in time of war as well as peace, irrespective of the nationality of the holders and that principal and interest will not be subject to any present or future Japanese taxes. The phrasing of the loan agreement, unique in American finance, was brought about by the recent United States immigration law and the fears on the part of American investors that a war between the two countries is a possibility at some time in the future. The wording was such as to appease these fears and it was learned that the Japanese government was so desirous of having the funds raised in the United States in order to show its friendly feeling that other foreign bankers were not even invited to bid for the issue.

Another feature of the issue which has elicited general interest is the close connection between the bank and the Japanese government. The Industrial Bank of Japan was created in 1906 by a special act of the Japanese diet upon the initiative of the government for the purpose of developing the economic resources of the empire through the purchase or underwriting of specified classes of securities, including rails, hydro-electric, sanitation projects, etc. The bank enjoys certain privileges but in turn is under close governmental supervision. The government appoints the president, vice-president and directors and a special government controller who acts independently of the bank's auditors elected by the shareholders. Among the recent issues underwritten by the bank are those of the Oriental Development Company, South Manchuria Railway Company, Great Consolidated Power Company, Ltd. and the City of Tokyo.

The Industrial Bank of Japan also headed the group composed of the Bank of Taiwan, Bank of Chosen and the Hypothec Bank, all semi-official institutions, which advanced over Y.100,000,000

to the Chinese government during 1918 and form part of what are generally known as the "Nishihara Loans." China has since attempted to characterize these loans as illegal and has refused to pay the interest amounting to eight per cent. per annum. Owing to this failure on the part of China to meet her obligations the banks concerned have been compelled to protect their clients by advancing the interest from their own reserves. It is no secret that this burden placed the Bank of Chosen and the Bank of Taiwan in an embarrassing financial position and that the load has been carried in large part by the Industrial Bank as head of the group. The campaign on the part of China to discredit these loans and justify the default of interest has been practically defeated since it is known that the American loans to China are in the same classification. If one group of loans is illegal, so are the others.

It is understood that ninety per cent. of the bank's business is in Japan and the balance in China. There is little doubt that the present loan will enable the Industrial Bank to carry its Chinese business until such time as conditions in China warrant a general reorganization of its finances, when the loans of 1918 will be included in the funded indebtedness with some tangible security behind the bonds. For the present however, the American banker is eminently satisfied with the unconditional guarantee of the Japanese government to the Industrial Bank notes and to the broad statement that the loan is for the general purposes of the bank without any qualification. It is a long step forward towards further Japanese-American co-operation.

The success of the Industrial Bank issue bears out the defense of the much maligned international banker so ably presented before the Institute of Politics by Dwight W. Morrow of J. P. Morgan & Company. In his statement Mr. Morrow pointed out that 11,000 persons bought the \$25,000,000 of Austrian bonds sold in America and that 48,000 bought the \$150,000,000 Japanese bonds. The international banker, he pointed out, is merely the middle-man who underwrites and sells the bonds to the public. He has to believe in the bonds himself, in the value of the security and the general good faith of the borrower. The easy money conditions with vast quantities of funds available for investment makes the United States at this time the most natural market for the flotation of foreign loans and now that our bankers are convinced of the sincerity, solvency and friendly intentions of Japan, they are quietly building up an edifice of good-will that will do more to ensure peace in the Pacific than all the protocols, conventions and treaties that have been signed to date having this object in view.

With the recent Industrial Bank issue, American investors now hold over \$212,000,000 of Japanese securities, all subscribed for in the past year. These bonds are probably held by over 100,000 investors and there is every reason to believe that the coming year will see this amount greatly increased by further issues for large Japanese development schemes. We know of no better guarantee for peace and amicable relations and for this we are indebted to the international banker. The theory that international bankers instigate wars for the purpose of collecting unpaid or defaulted debts or lend money for the purpose of provoking hostilities is an absurd one. The banker knows better than any one else how poor a weapon war is for that purpose. He controls a better way for regulating world affairs, the reverse of the accepted theory. His weapon is to refuse financial assistance to those governments who fail to measure up to his standards. The effectiveness of this weapon is driving the Soviet into line, with the rest of the world. It has taught Mexico a lesson and in due time will have its full effect on China. The more American money flows into Japan for investment with or without government guarantees, the more close will become the financial and commercial co-operation between the two peoples; the greater are the possibilities for a continuance of those friendly relations and that mutual esteem which will help to keep down the cost of armaments. American co-operation with Japan in financing the development of Manchuria and Mongolia and carrying out the plans of the South Manchuria Railway Company will also contribute towards this much to the desired end. American co-operation along these lines with Japan is the surest guarantee that China's rights and sovereignty will be fully respected. There are indications that American bankers are beginning to grasp the truth of this statement by a willingness to lend money to Japan for development work in these territories.

The Hon. Mr. A. G. Stephen

(Continued from page 414.)

There was a time, during the war, when actual coined dollars were needed—and needed badly. Mr. Stephen sent out a request for the specie and it came pouring in from Chinese and foreign sources as well, until the crisis not only was past but the bank's vaults were overflowing with specie. No premium was paid for none was asked. The Bank wanted the dollars, and there they were.

Mr. A. G. Stephen's connection with the Bank extends back to 1885 when he arrived in Hongkong as a junior; but within a year he was transferred to Batavia. After nearly six years' service there he had two quick transfers first to Singapore and then to Bombay; in 1896 he returned to Batavia as accountant. In 1902 he was appointed agent at Penang and in 1906 was promoted to manager, in which capacity he served for five years. Prior to taking over charge of the Shanghai branch from Mr. H. E. R. Hunter he was inspector of the North China branches, in 1911.

Manager in Shanghai

In the spring of 1911 he came to Shanghai and assisted the late Mr. H. E. R. Hunter in the management. A year later he succeeded on Mr. Hunter's retiring and remained manager in Shanghai until April, 1920. During this time he had many most anxious crises with which to deal, including the terribly anxious week of revolution in 1913, and the financial crisis of May 1916, when the Chinese government declared a moratorium which very nearly threw the Chinese bankers into hysterics. On all these occasions Mr. Stephen's calm and dominating personality was of incalculable value in keeping the local market steady. Chinese bankers were deep in admiration for him and, on his going Home in 1920, they presented him with several valuable testimonials. It may also be recalled that at the end of the war, the diplomatic body in Peking unanimously invited him to liquidate the Deutsch-Asiatische Bank, which was done with thoroughness.

Among other recollections, it was Mr. Stephen who proposed that if the Chinese government would establish in Shanghai a properly managed and controlled mint, which should coin dollars of stable value, other provincial mints being abolished, foreign banks would be prepared to accept these dollars as the coinage of the country and keep their accounts in them. We know the fiasco in which the project ended, but that was not Mr. Stephen's fault. He also took no little trouble for the formation of a bankers' association in Shanghai, which would have included both Chinese and foreign banks, but in this he could not bring all concerned into line. It may also be mentioned that he was very strongly in favor of the municipal council issuing its own coinage in order to counteract the evil of depreciated copper; this idea was scoffed at when he advanced it, but one has since heard it advocated since in several different quarters.

Chief Manager

In April, 1920, Mr. Stephen went Home for eight months' leave in the same ship with Sir Havilland de Sausmarez and Dean Walker. He returned a year later to Hongkong as chief manager, and under his charge the prosperity of the Hongkong and Shanghai Bank has certainly "moulted no feather." In illustration of Mr. Stephen's breadth of view, it may be mentioned that the great Wayfoong building in Shanghai was almost entirely due to his advocacy: left to themselves, the court of directors would probably have built something much more modest. Mr. Stephen had great ideas of embellishing the old bank house in Hongkong. It was due to his influence that the court of directors purchased the wonderful collection of Chinnery's drawings and paintings, when they came into the market a few years ago, which now hang in that house. He also bought, out of his own means, not a few pictures and handsome pieces of furniture, to present to the chief manager's house. He was for several years a member of the legislative council of the governor of Hongkong.

THE HON. MR. A. G. STEPHEN

Late Chief Manager, Hongkong and Shanghai Banking Corporation

CHINA has lost one of its best known British residents, a brilliant businessman and a charming social figure, through the death of Mr. A. G. Stephen, chief manager of the Hongkong and Shanghai Banking Corporation, who died in London, August 27. The news came as a profound shock to a large circle of close personal friends, officials and members of the whole business community of China, Mr. Stephen having had that rare power of making a personal friend of practically every person with whom he came in contact whether he granted or refused the banking favors they asked. No man in similar position will be more sincerely mourned, for his unerring



"A man whose knowledge of business and finance is unparalled and whose services to the Empire and its Eastern connections are well-known."

judgement of men and his quick estimation of character as an asset brought many to help strengthen the Bank after he had enabled them to find their financial feet.

So far as a banker can be, he was a philanthropist. The business that went on the rocks through no fault of its own always found in him a kindly counsellor and, if honesty as an asset was in sight, a generous creditor. Had he died in Shanghai, the man who failed to be present at his obsequies would have been looked upon askance for the men and firms he aided were legion. No banker in Shanghai ever had more loyal supporters—and this does not refer only to foreigners.

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The War in China

B.C. 2000—A.D. 1924. The Same Old Story

By Our Special War Correspondent at the Front.

With Apologies to J. P. O. Bland.

THE long heralded war in China is on. Far Eastern newspapers are devoting columns of space to the most insignificant details of troop movements, engagements and the opinions of experts. A new group of war correspondents has appeared on the scene regaling the public with censored news fresh from this or that G. H. Q., from "the front" or from behind sectors or trenches. The vocabulary of the world-war has been revived and is working overtime. The Chekiang army has "dug itself in," artillery duels and machine gun fire make a realistic setting for bombing and scout planes and red cross activities. It is all very thrilling and just as the war began to grow really interesting and there was hope of a decisive battle in the Shanghai sector, the inevitable happened.

Two of Marshal Lu's division generals operating on the Fukien border sold out to the other side accepting a defeat after a sham battle and retired, finally turning altogether and joined with the enemy to march on Marshal Lu's capital at Hangchow. Threatened from the rear and with his loyal troops holding their position along the extended battle front a hundred miles away in the neighborhood of Shanghai, the Chekiang war-lord had no option but to hurriedly pack up his wives, his children, art treasures and chests of silver sycee and beat a hasty retreat forward to the safe shelter of his G. H. Q., at Lunghwa in the environs of the model settlement. The war as far as Chekiang is concerned is over.

Meanwhile the battle rages, and the sound of the heavy artillery and machine gun fire is wafted to the ears of the foreign community in Shanghai who patiently awaits the outcome.

It is difficult and unwise to anticipate events and prophecy which side will win. The story of the war, however, is another matter. It was accurately reported years ago by a competent war-correspondent who described every move that has been made to date. We are going to permit J. O. P. Bland to tell the story of the present war in China which differs very little except in names, dates, places and the arms used, with the campaign of Field Marshal Wang Sun-ki against the King of Wu in the year 2000 B.C.

Mr. Bland tells the story of the war in his most interesting book published years ago entitled "Houseboat Days in China." Substituting Kiangsu and Chekiang for the kingdoms of Wu and Han the story is still true to form and present conditions. The modern newspapers controlled by the contending governments now do the shouting and hurl imprecations at the other side while the lineal descendants of Wang Sun-ki eat and make merry at the festive board while they conclude the arrangements for selling out at the proper moment. Mr. Bland says:

* * *

"In the year B.C. 2000 or thereabouts, there was no such thing in the Far East as the 'fortune of war'—at least, not in the sense in which we use the phrase to-day. There were fortunes in war, as will presently be seen; but its glorious uncertainties, its reverses and surprises, had ceased to exist. The winning and losing of battles had been reduced to the simplicity of a multiplication sum, all of which was due to the genius of one great man, General Wang, to wit, field-marshal of the forces of his Majesty Chang Wu, King of the Hans.

"At that period China was divided, like Gaul, into three parts, and ruled by three dynasties known respectively as the Han, the Wei and the Wu. Buffer states were unknown in those good old days, and the three kingdoms aforesaid were always in a healthy state of active hostility. And as it invariably happened that when any one of them got the better of another, the third would 'chip in' and reverse the situation, the balance of power was in a chronic

condition of wobble; which state of things was good for all parties, keeping the people occupied and saving their three rulers from ennui, a complaint which frequently proved fatal in those pre-dynamite-and-new-woman days.

"Such was the condition of affairs when Wang Sun-ki passed his final examination in archery and shouting, and became a corporal in the bodyguard of his Majesty Chang Wu. From the very first—so say the commentators, his great mind grasped the idea of a radical reform in the art of war. He saw clearly in the strategy and tactics of the day many glaring defects, and to the inauguration of the system which was to make him famous he devoted all his splendid energies.

"His rise was very rapid—partly, as is often the case with great commanders, by what we call luck, partly by help and favor of lovely woman, but chiefly through his own prudence and strength of mind. For, by careful avoidance of all dangerous posts, and by exceeding swiftness of foot, he preserved for his country a life that he knew to be worth more to him than that of any other man; never, even in the prospect of battle, did this great soldier forget his plans so far as to risk his person.

"His first notable achievement was his marriage with Ling Mei, sister of one of the unclassified or miscellaneous ladies who basked in the sunshine of Chang Wu's court. Through the influence of this model wife, Wang, now a captain of cavalry, became versed in all the details of his sovereign's life, and was soon able to place the usual bribes and *douceurs* with the very best effect. When, after remarkably rapid promotions and unbroken service at headquarters, he became *aide-de-camp* to his majesty and full colonel of the royal catapulters, it is recorded that he divorced the lady Ling Mei, 'for having become garrulous,' and immediately afterwards married one of the numerous princesses royal—a lady with some wealth, a deal of acidity and a squint—which self-denial meets with much praise of the commentators. At this period our gallant colonel began to find again the bread which he had cast upon the waters of his youth; where heretofore he had bribed others he now found his own palm frequently and pleasantly greased; so much so, indeed, that he rapidly became a capitalist and landed proprietor.

"It was at this point of his career that there began to flow the tide in his affairs which was to lead him on to fortune and eternal fame. Just as the squint and humors of his princess royal were commencing to tell seriously on his nerves, causing him unpleasant doubts and qualms as regards the "sacking" of Ling Mei, tidings reached the court of the advance of a large army from the Wu frontiers. This in itself was bad enough, but when it became known that the king of Wei had made a formal declaration of neutrality, things began to look serious.

"For it was only three years before that the joint forces of Han and Wei had invaded the Wu territories, exacted heavy penalties, and bound over the turbulent king thereof to keep the peace; and it had been solemnly agreed in the resultant treaty that the rulers of Han and Wei should be as brothers for ever—both being, at that particular time, weaker than the king of Wu.

"Here, then, was treachery and intrigue, and a prospect of much fighting, and our gallant Wang found himself suddenly ordered from the squint of his unamiable princess to the command of the Han force in the field—found himself, moreover, decorated with a peacock's plume and wearing the pipe and tinder-box of a field-marshal.

"Now, as the reader will have observed, the great genius of Marshal Wang had not, so far, developed itself in the stress and turmoil of battles. Rather had it been shown in a wonderful capacity for circumventing his fellow men in times of profound

peace. His nomination to the leadership of the Han army is, therefore, regarded by the shrewdest of the commentators as the joint work of his Majesty Chang Wu—with a covetous eye on the reversion of Wang's real and personal estate—and of the lady Wang, tired of her lord's marked aversion to squints.

"Behold, therefore, our field-marshal at the head of his army, riding in state on an ambling jennet, his head protected from the sun by the red umbrella of honor. Around him are gathered his lictors and a body-guard of athletes and acrobats. For miles behind, and straggling over the fields on either side, his 'braves' are making their way, in extremely loose order, towards the Wu frontier. Each man carries his weapon in one hand and an umbrella in the other, for it is the rainy season and showers are frequent. An imposing sight is the departure of this great army; the citizens stand on the walls and cheer lustily as regiment upon regiment straggles over the ploughed country, looking for all the world like a caucas race.

"Slower and slower ambles the fat jennet as the city walls fade in the distance. The great chief is lost in thought in the first throes of that tremendous conception which is soon to revolutionize war. At the mid-day hour, on the edge of a pine forest, he commands a halt, and here, while dinner is being prepared, he orders that the army be drawn up in hollow square, from the centre of which he will address it. Such is the intimation conveyed by the herald and gong-beaters; and soon the smoke of five thousand rice pots is curling upwards on the soft spring air.

"And now the immortal Wang, with his jade spectacles on his nose and the peacock's plume proudly waving, is mounted on the roof of a sedan chair. Behind him the trumpets sound a war note, and immediately the whole camp is hushed. So still is all that vast host you could hear a baby cry.

"Men of Han," said the great commander, "the campaign on which we are now setting out is no ordinary one; it is for you and me to make it ever memorable! It is, I believe, our common object to keep the enemy's forces from invading our territories, from marrying our wives and enslaving our children; and a secondary aim is ours in the desire to come out of this war with our persons undamaged and our pockets heavy. (Applause.) But, as I look upon your honest faces, I am thoroughly convinced that the army with which I am told to 'do or die' is totally unable to face the Wu forces with any sort of credit. Your numbers are insufficient, your weapons beneath contempt and your commissariat does not exist. (Groans.) All these faults, my friends, are due to the administration of military affairs by civilians." (A voice from the ranks: "Let us go back.")

"No, friends, we will not go back, for that way lies dishonor; before us are wealth and honor and a ripe old age." Here the field-marshal resorted to his silver snuff-bottle, and all the army breathed deep in expectation.

"As I have said," he continued, "your appearance is such as to convince me of your utter inability to fight, and my experience teaches me that you would never wait to do so. That discretion for which my troops have ever been famous would lead you to outmanœuvre the foe by strategic and rapid movements to the rear. You would return to your own homes, and I would be left to do the same, with the inevitable prospect of explaining affairs to an irate sovereign, which would be very unpleasant for all of us. Therefore, oh! men of Han, thank Heaven that it has sent you a chief capable of leading you to certain and painless victory. Eat your fill of rice to-day, and to-morrow go forward, leaving the issues of this war with me alone. They have told us to do or die. I think I am right in saying that we unanimously choose the former alternative. Let us therefore resolve to 'do'—(A voice: "What?")—to 'do' that civil administration which is the cause of all a soldier's trials and dangers!" (Great applause, then silence.)

"I see, friends, that you do not grasp my meaning. I am glad of it. All I now ask of you is that no man of you shall start for home during the next forty-eight hours. I myself guarantee your personal safety—on my red button be it!—but any premature desertion will upset all my plans. Let us but come in sight of the enemy and you may leave the rest to me. And, friends, meanwhile let our watchword be 'do—not die!'"

"After which oration the field-marshal remounted his ambling steed, camp was struck (it was the only thing struck during the campaign), and the army straggled cheerfully towards the frontier. Such was the combined effect of the speech and a plentiful meal that several regiments sang as they marched.

"The commentators rival each other in eulogising Wang's grasp of the situation and of his appreciation of the materials at his command. It was the practice in those days for the weaker army to march to within shouting distance of the enemy, at which point every man would discharge his weapon, throw it away, and flee for home as best he could. How different to such conventional and dangerous tactics were the methods of the immortal Wang! Has not his famous watchword, 'do—not die,' become proverbial throughout all Cathay? Is it not always in use by the makers of rhymed couplets?"

"The army had advanced two days' march—about six miles—since the making of the great speech; its soothing effect had thus partly worn off when the elephants at the head of the Wu vanguard appeared in a valley beneath it. The Hans gazed in silence as the enemy's forces wound their way like a gigantic snake round the base of the opposite hills; and the habits of their old military training came strongly upon them. 'If we shout from here,' said a bronzed veteran, 'surely they can hear us. And what place could be better for discharging our weapons?' The impulse spread like wild fire, and scarce a man in all that vast host but thought with joy of seeing his home again before the rising of another sun.

"They had forgotten their chief. Thoughtfully gazing on the enemy below, that great man sat erect in his saddle, heedless of all around. Silent he sat 'as on a peak in Darien,' until his well-trained eye detected the commander of the Wu forces in his usual place at the extreme rear. Then, turning in his stirrups, he spoke to his body-guard, or rather to that place where, had discipline prevailed, the body-guard should have been.

"Summon me a herald," he cried, "and call hither my treasurer and the chief scribe, for with these I will go down into the valley. You, my brave fellows, will wait here. Should the enemy cross yonder stream, you are at liberty to follow your own instincts and knowledge of the country; but if not, I shall expect every man to be here when I return—it will go ill with you, my friends, if my expectations are not fulfilled."

"A shout of approval went up, for the terms were easy. This was an entirely new departure in warfare. Few expected to see their general again this side the grave, and still fewer believed him able to persuade the enemy to remain on the further side of the stream. Therefore the army gathered itself joyfully about the rice cauldrons and prepared to enjoy a day of rest, husbanding their energies for a night of flight. A trumpeter only remained on the hilltop to watch the enemy and give a signal when the river should be crossed.

"Field-Marshal Wang, with herald, scribe, and treasurer, all clean shaven and in full uniform, rode therefore to meet the Wu army—a proceeding totally without precedent, and not to be found in the treatises on war. They carried no weapons, nor (with the exception of Wang's insignia) valuables of any kind—all these had been left with the field chest in charge of the field-marshal's own relatives and retainers, with orders to make straight for the house of Wang in case of an advance of the enemy.

"The field-marshal rode light and without misgivings. If he died, he had effected an insurance—so to speak—on his life; if he lived, fame and fatness were his assuredly.

"In this wise they came therefore within three bow-shots of the Wu vanguard, which, seeing what it mistook for an approach of cavalry, promptly fell back on the main body. Some confusion resulted which might easily have ended in a panic, had not Wang, with keen military insight, understood the position. Immediately he dispatched the herald to proclaim that the field-marshal of the Hans, unarmed and unsupported, desired an interview with the Wu commander-in-chief. No sooner was this message understood than the army rallied, and the four envoys found themselves prisoners. Their persons were searched and treated with some want of courtesy, their lack of valuables being unfavorably criticised. All this Wang had expected; with composure he witnessed the removal of his peacock's feather, tinder-box and ambling jennet. All he asked was an interview with the commander-in-chief, and he awaited with admirable composure the arrival of that dignitary.

"The details of that interview have never been made public, but its results were the fulfilling of all Wang's hopes and the dawn of China's modern system of warfare. Before nightfall the Wu forces were in full retreat towards their frontier, carrying with them not only the war chest (two million taels of silver), but many weapons, flags and uniforms belonging to the army of his Majesty Chang

Wu; also that same evening Field-Marshal Wang, having recovered his personal property, encamped his forces in that pleasant valley, and dispatched messengers in haste to the capital with news of a great victory.

"His despatches, still preserved in the national archives, are masterpieces of their kind, and have since been the type for all such documents, even unto the present day. Seated luxuriously on a soft-cushioned divan, our hero wrote in flowery, classic style of stricken fields and horrid deeds of blood; with the peaceful voices of his happy 'braves' in his ears he recorded their terrible slaughter and the first hard won fight. And while graphically describing to his king the scene and details of his victory, he sent in token thereof five banners, two hundred arbalists, and an elephant, abandoned (for value received) by the Wu army in its retreat.

"The first despatch ends as follows:—

"The enemy, your majesty, is now in full retreat for the hilly country towards Wingtaishan, and thither we shall pursue and harass him forthwith. One or two more victories and the king of Wu is a suppliant at your majesty's feet. Before anything further can be done, however, our funds must be replenished. The expenses in this campaign are peculiarly heavy. Your army, more numerous than ever before in the field, needs a generous commissariat, and the country is extremely poor. It will be necessary to buy horses and equip a force of cavalry, etc. Therefore your servant prays that a sum of at least five million taels be sent under reliable escort to the front with as little delay as possible."

"Here follows a list of the killed and wounded, together with recommendations for honors and promotion, in which latter the herald, scribe, and treasurer are honorably prominent.

"That same night, having sent off his despatches, Field-Marshal Wang dined with Hung, commander-in-chief of the Wu army, at a little inn some three miles from the scene of their first meeting. Here, under a trellised vine, the generals discussed their evening meal and the coming campaign. 'Fair play and a clean divide,' were Hung's terms; 'turn and turn about for victory; a long war, and profits shared.' Which was precisely the way in which Wang had already solved the matter.

"Over a second bottle of *samshu* they arranged the details; the management of the troops, who were to be well paid, refused furlough, and encouraged to marry and settle down; the treatment of messengers, heralds, and war correspondents, who must either be bought or sold; the necessity for removing the seat of war to a point far away from both capitals—these and other minor matters were soon amicably arranged. And as the two generals bade each other good-night over a last cup, it is recorded that Hung fell on his knees before the illustrious Wang and *kotowed*. 'That makes eight millions to begin with,' he said, 'and this is our first. You are the greatest soldier that ever lived!'

"We need not follow the progress of that campaign. Removed to the borders of the Wei territory, the fortune of war ebbed and flowed for three years, both sides claiming frequent (and expensive) victories. At the end of that time the civilian population of both countries was practically (an inkling of the art of war having leaked out) deserting trade for a military career by thousands. At this period, moreover, the troops of Wei, having gradually perceived the immense advantages of Wang's tactics, took the field of their own accord against the combined forces of Han and Wu. These latter, having after successive victories remitted all their arms, elephants, and *impedimenta* to each other's emperors, were not in a fit state to resist an attack; besides which, the greater part of both armies had accumulated money, settled down, and begun to provide themselves with heirs. There was nothing for it, therefore, but to accede to the terms imposed by the Wei leaders, especially as these were not difficult. The Wei general reported a victory over the allied forces of Han and Wu, asked for funds to continue the campaign, and joined the enemy. The operation, in fact, was equivalent to what in these days we call 'watering the stock' and increasing the number of shareholders.

"Such was the nine years' war, the first and only campaign in which our great field-marshal ever took part. It ended in the declaration of a general peace—which proved to be the beginning of hostilities—a declaration brought about not because the armies wanted it, but because the rest of the population did. From that day to this the system and tactics of the immortal Wang have been closely followed by every Chinese general with few variations.

"And, as one of the commentators aptly asks: 'What method could possibly be better? By this system you see large numbers of violent men constrained to peaceful days and provided with a livelihood. Difficult questions are thus settled, not by bloodshed and tears, but by lapse of days and friendly agreement. Finally, the kingly greed of glory is harmlessly satisfied, while the people are kept in a state of healthy excitement. Rightly did the illustrious Wang gain a place in our *Pantheon*!'

* * *

"In the war which China waged against Japan, it was with the greatest pain and surprise that her generals found their system of classical warfare unknown to the Japanese—or, at all events, unpractised by them. So keenly did they feel on this subject, and so unwilling were they to depart from established custom, that the whole Chinese army—generals, corporals and privates—preferred rather to give up their profession than continue a war on the lines adopted by the enemy. 'There is no money in it,' they said, 'and very considerable personal risk.'

"The reader has, therefore, only to remember this fact to understand the Japanese victory at Pingyang. On the glorious day, out of 20,000 Chinese in action, 16,000 were made prisoners and 3,984 escaped to the hills, the fate of the remaining sixteen being uncertain. If they were killed it was certainly through no fault of theirs, but through ignorance of the range of modern musketry."

* * *

The Origins of the War

A Frivolous Report for Serious Minds

By Peggy Hull

Formerly War Correspondent with the American Expeditionary Forces in Siberia, France and the Mexican Border

DURING the world war one of the most popular songs among the soldiers ran something like this—

"Good-bye Maw, good-bye Paw,
Good-bye Mule with the old hee haw,
I don't know what this war's about,
But I bet by gosh I soon find out."

That is what I thought I would do when hostilities in the vicinity of Shanghai took our minds away from the usual diversions of the day. Ordinarily it is a simple matter to find out who started a fight and why—but when I confided my intentions to a friend, he skeptically remarked, "This is China."

From a list of people who enjoy reputations as experts on China, I selected a few names and started out on a reason-destroying task.

"This, of course" remarked Eminent Expert No. 1, "is a complicated case which will not be easily understood by the average lay mind, and will therefore be more difficult for the feminine brain to assimilate."

I marshaled all my wits after this remark and leaned forward in my chair, prepared to listen intently.

"In order," he went on "to appreciate the bitterness of this conflict we must go back to the time of Confucius, 2,500 years ago"—this seemed a long time to go back for a little war that had just started a few days before, but I recalled he was an expert and probably my feminine brain was not assimilating properly.

"It was then" he explained with a dramatic sweeping gesture toward the 2,500 years ago, "that the seeds of internal strife were sown between Chekiang and Kiangsu, and the battle now being fought beyond the settlement boundaries is nothing more or less than the fruits of that sowing centuries ago." What old seeds they must have been!

"The rivalry which existed in those days" continued the expert on Chinese politics, "has been handed down from father to son, a heritage of hate, and until this enmity can be stamped out, until education along the principles upheld by the western peoples, the principles of love, peace and unselfishness can be taught the natives, this wretched country will be forever involved in warfare."

He concluded his statement with an emphatic bang on the teak-wood table. "There" he said, "you have the cause — and if it is a bit difficult to understand, do not feel too much concern about it, there are thousands of others who will not be able to, either."

I thanked him and ventured one more query. "What will result from this conflict?"

"Oh that is very simple—" he replied hastily, "yes, yes, very simple. This sort of political unrest and bickering is bad for our trade, upsetting to our nerves, and of great inconvenience to our families who are absolutely cut off from their usual evening motor rides around the Rubicon. Consequently there can be but one possible result. The United States will have to take Chekiang and England Kiangsu, put in their own governors and run the provinces until such time as the natives have learned self-control and done away with this spirit of conquest and aggressiveness. Yes, the results will be quite simple." He smiled benignly at me and turned his scholarly attention to a paper-littered desk.

On my list was the name of a business man, young, ambitious, and well known as a clear thinker. He had not lived so long in Shanghai as the Eminent Expert No. 1 but he was the sort who keeps up with the affairs of any country in which he happens to be.

As I entered his office he carefully flicked a bit of waste paper from the shining glass top of the mahogany barrier between us and smiled a welcome. I knew right away that here would be no suggestions about the lack of thinking material in the female head. He had been sued for breach of promise once—and lost the case.

"To me" he began seriously, "this is a fascinating political problem. Never, even in the hottest campaigns in the United States have I been so interested in a situation as in this. I can't help but admire Lu and Chi for putting their armies into the field to settle an argument between themselves. It smacks of primitive days and makes one forget the humdrum life of how many tins to get off on the next boat. Of course I have my own opinion about how the argument really started and I am sure if anyone else in Shanghai had followed the news of the past six months as closely as I have that he would agree with me." He hesitated, drew deeply on his cigarette and leaned back in his swivel chair, looking at me through narrowed eye-lids. There was an air of shrewdness and supreme self-confidence about him. At just the proper moment he suddenly shot a question at me—"Do you know that the union of Soviet socialist republics is back of this?"

I was taken completely by surprise and had to admit that I didn't know it—hadn't even thought of such a possibility. This annoyed him but he went on. "They have engineered the whole affair just to get us entangled so that we will either have to fight or get out of the country. Of course they know the American government is not the kind to go to war over a few citizens and their property so they are banking on making the Chinese think we are trying to grab the country by mobilizing all our warships here—who will then invite us to take them and go home.

"The U. S. S. R. desired this above all things as they will appropriate all the foreign property here and carry on where we left off. Oh the pity of it" and he almost moaned "there isn't a man in Shanghai to-day who wouldn't rather be somewhere else and yet we have stayed here year in and year out, depriving ourselves of the pleasure of living in our own country—boy bring me a whiskey soda" he called out suddenly as though the mention of his country had brought a tantalizing memory. "Need a bracer" he explained "when I think of all that is before me."

"Then you believe it is serious and will not end with the civil war between Lu and Chi and Chang and Wu," I asked, thinking of the seeds sown 2,500 years ago.

"Of course not. This is the most far reaching piece of diplomatic roguery we will ever witness in our time. There is only one thing to do, prepare to face it" and he finished off his glass.

So that was it. Confucius and the seeds and the heritage of hate had nothing to do with it. But upon second thought I decided I had better have one of the above explanations verified by another expert and upon consulting my list was horrified to find that I had overlooked the most eminent of all the eminent men who are experts on the internal troubles of China.

He laughed sarcastically when I laid the statements of the other experts before him.

"How assinine" he exclaimed. "Is it any wonder that we have wars when such misinformed and incompetent people are permitted to air their opinions on these subjects that need years of study and research. Subjects so delicate, intricate and complex that

only the most highly developed brain is capable of comprehending them.

"It is not" he assured me, "my custom to give opinions to the public on the various crises as they arise. I have found in the past that it does not pay. Small editors and would-be political experts criticise my efforts and cause me no little annoyance. Consequently my information is kept for certain circles. But under the present circumstances I am glad to give you a correct account of what has led up to this sudden war.

"It has long been known in secret places that the Indians have had their eyes on the conquest of China. If not, I ask you, why are there so many Sikhs in the settlement? Does not their presence indicate that their countrymen are planning and working to get this beautiful land in their grasp and annex it to the Indian empire which they hope to shake free from England's hold? Isn't it true that these very same Sikhs speak the dialects of China fluently and show through their arrogant and brutal treatment of the richsha coolies that they are but the vanguard of an invading race? I assure you that it is not the wish of these gallant men who are fighting now, to fight. Any sincere student of China and Chinese history knows that the Chinese are thoroughly honest, generous, peaceful and love each other dearly. It is their desire to live quiet, industrious, religious lives but the pernicious influence of this power which is seeking a foothold here, keeps through the persuasiveness of gold, the country in a state of warfare.

"The puerile reason offered by so many that Lu and Chi are fighting over the geographical position of Shanghai is ridiculous. Why should they care which province it is in? They love each other like twin brothers. They have been devoted for years, dividing their honors and incomes. And Chang Tso-lin and Wu Pei-fu—it makes me laugh" and he said "why they have eaten out of the same rice bowl! No, it is not the Chinese who are fighting this battle but the sinister figure of corruption behind them and I am more than grateful to have this opportunity to tell the world what really causes China's wars." He sank into a chair and breathed heavily at the close of this exhortation. While he was deep in thought I quietly slipped away.

When the chauffeur said "where go?" I had an inspiration and throwing my list of experts away asked him what had caused the war.

"Oh" he answered quickly "I savvy this war plenty. All Chinese man makee fight wantchee be number one. I think more better fashion before time have number one stop Peking side. Now have got too many number one, all time makee plenty bobbory."

I decided that my quest was ended and stopped for a cup of tea with a Shanghai matron. She was talkative so I ventured once more, "What's it all about?"

"Well, it was this way," she explained, drawing designs on the tea cloth. "Marshal Chi was down his full stake and Lu was up that amount. Chi had a limit hand and Lu knew it. So he chowed out of turn and mah-jonged when it was Chi's pung and game."

* * *

German Trade with the Orient

C. C. Bachelder, former representative of the department of commerce in the Far East, told the Institute of Politics at Williams-town that students of the Dawes plan had concluded that on the markets of the Orient depended the possibility of Germany selling enough manufactured products to pay the large sums of money due to the allies.

"In all the discussions of the Dawes plans," Mr. Bachelder said, "great stress is laid upon the fact that it will be very difficult for Germany to pay to the allied powers the large sums called for by its terms except from the surplus of its exports over its imports. As the purchasing power of Russia, Turkey and other countries will evidently be much less than before the war, it will be difficult for Germany to sell abroad as much as before the war unless its other customers buy more. It hardly seems likely that the purchases of Europe and North and South America will be increased enough to make up for the deficiency, and the only opportunity for a very great expansion of its sales of manufactured products seems to be in the Orient, which is the home of about half of the human race."

The opinion of this trade expert, however, is not shared by the present chief of the bureau of foreign and domestic commerce who invites attention to the returns which show that although German trade with the Orient had increased in value in 1923 by thirty per cent. over pre-war years there was little increase in quantity. In the opinion of F. R. Eldridge, so far as Far Eastern trade with Germany is concerned, there appears to be little that the Dawes plan can accomplish in the way of restoring to Germany its pre-war Oriental markets. It is a revelation to those not familiar with the rapid return of Germany in the Far East to learn that in Germany's four principal markets—Japan, China, Netherlands East Indies, and India—the amount of imports from Germany during 1923 was 30 per cent. greater than during the pre-war year of 1913. The trade of these countries translated into dollars shows that while they imported but \$106,577,000 worth of Germany's products in the pre-war year, their imports last year totaled \$142,316,000. Taking into consideration the higher price levels in these countries, which averaged about 60 per cent. in 1923, there is little absolute increase in quantity for imports from Germany, although the value of German imports shows a substantial gain.

The Far Eastern trade with Germany during 1923 is compared with that of the pre-war year 1913 in the following table:—

IMPORTS.				
Countries		1913.		1923.
Japan .. ..	..	\$32,197,000		\$60,121,000
China .. ..	..	20,660,000		25,964,000
Netherlands East Indies ..	..	11,510,000		*19,361,000
India .. ..	..	42,210,000		36,870,000
Total .. ..	..	\$106,577,000		\$142,316,000
EXPORTS.				
Countries		1913.		1923.
Japan .. ..	..	\$6,744,000		\$1,696,000
China .. ..	..	12,428,000		19,273,000
Netherlands East Indies ..	..	5,722,000		*6,956,000
India .. ..	..	87,940,000		71,456,000
Total .. ..	..	\$112,834,000		\$99,381,000

*For 1922—later figures not available.

The exportation from these same Far Eastern countries to Germany during 1923 was 10 per cent. less than that to Germany in 1913. Again, applying the 60 per cent. average increase in wholesale price indices for the Far Eastern countries, a considerable decrease in the absolute quantity of Far Eastern exports to Germany is evident.

Japan's trade with Germany reveals some remarkable developments. In the single item of woolen or worsted yarns the imports from Germany for the first six months of 1923 were 12 times as large as for the corresponding period in 1913. Machinery and engines also showed a substantial increase over the 1913 figures, being more than double, while aniline dye imports from Germany in 1923 were three times the 1913 value. Japan's exports to Germany showed a decline, and in 1923 were about one-third the 1913 value, although camphor exports showed an actual increase.

Imports into Japan from Germany during 1923 totaled Y. 120,242,000 (Y.1 equals \$0.4858 at average exchange for 1923, and \$0.4985 at normal exchange), and exports to Germany amounted to Y.3,392,000. Details of the year's trade are not available.

China's trade with Germany does not show the same recovery as that of Japan's. Considering the increased prices in 1923, there is apparently an actual decline in the volume of China's imports from Germany compared with the pre-war year, although the exports to Germany from China show approximately a 120 per cent. increase in value as against a 45 per cent. increase in price level. Imports to the value of 32,456,067 haikwan taels and exports worth 34,092,022 taels constituted China's trade with Germany during 1923. The details of the importation and exportation of the various commodities are not available.

The trade of the Netherlands East Indies with Germany showed a decided recovery during the nine years ended 1922, the latest period for which statistics are available. The increase in value, however, just about equals the increase in the Netherlands East Indies' price

level and, therefore, it can be assumed that gains in quantities imported from Germany were small. In such items as machinery, iron and steel, hardware, glassware, and paper manufactures, however, there are substantial increases even in quantity. Exports from the Netherlands East Indies to Germany showed little advance, and in actual quantity registered a decrease.

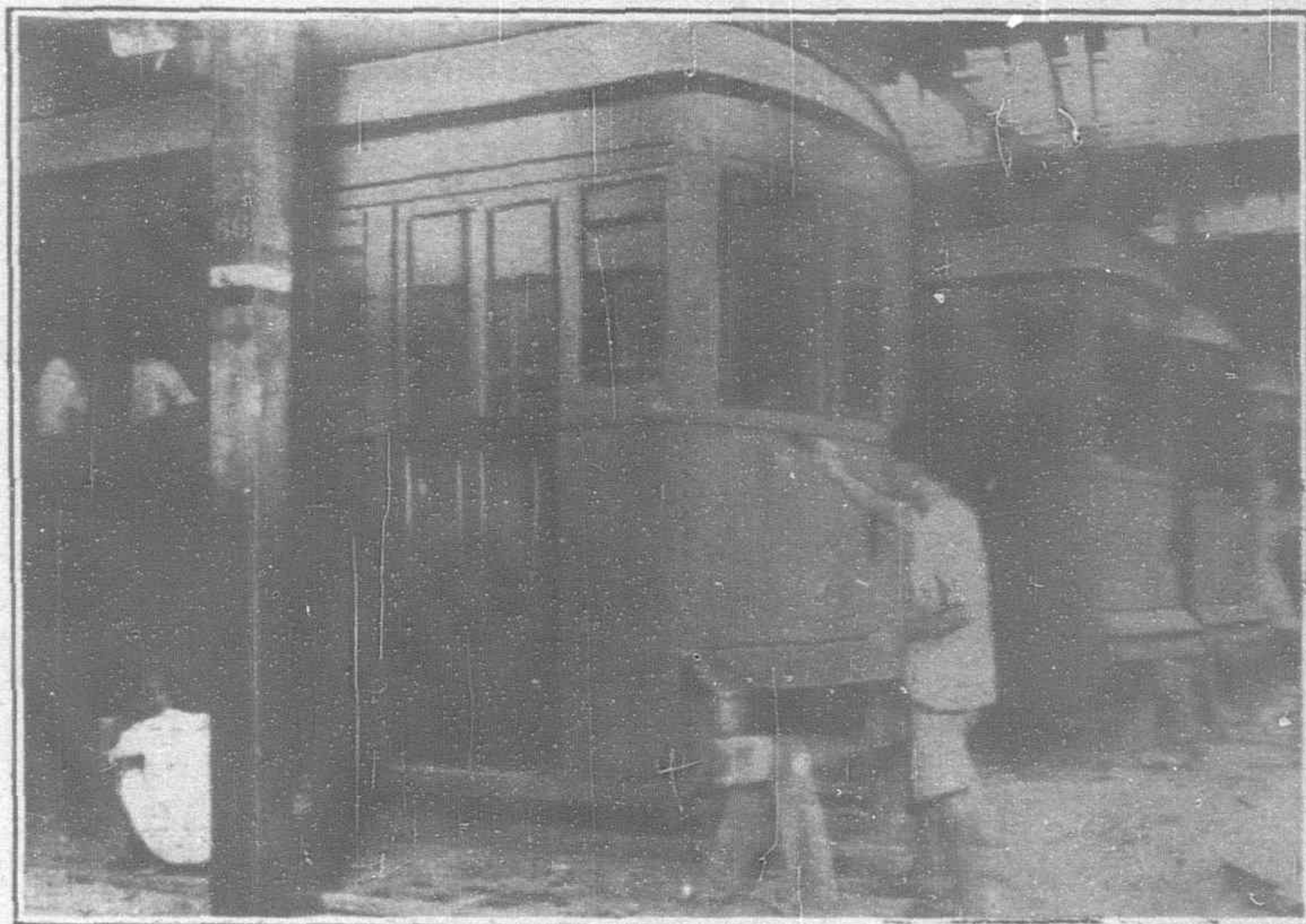
Germany's trade with India has recovered less than that with any other Far Eastern country, and both the import and export trade between the two countries has declined compared with 1913-1914. There are increases, however, in such items as coal-tar dyes, hardware, glassware, and newsprint. The principal decrease in Indian exports to Germany took place in hides and skins and jute, while raw cotton registered an increase over the 1913 figures.

Germany's ability to regain its Far Eastern trade has been due almost entirely to organization. During the war there were many German engineers who remained in the Netherlands East Indies and continued to keep intact the contracts which they had established there. When the war was over these engineers were on hand, and, although operating under great restrictions in British territory throughout the Far East, they were able to extend Germany's trade from nothing at the end of the war to almost its pre-war figure. In China, German engineers have benefited through the Sino-German treaty, which gives up extraterritoriality, but permits Germans to travel at will in the interior. Latest reports indicate that German engineering firms are very active, in the interior, and are establishing many industries on a co-operative plan, the Chinese putting up the working capital and the German firms supplying the machinery. Thus, many cement works, glass factories, egg-drying establishments, and other local industries are being fostered through German enterprise in China. Germany's comeback in Japan has been one of the most remarkable in the whole Far East, and the Japanese dye industry recently had to be protected by the imposition of a licensing system which was aimed particularly at German dye imports.

German exports to the Far East are carried in German ships, and are financed by such strong combinations of capital as the Stinnes group, which has been particularly active in the Orient during the last few years. The results of their activity are indicated in the trade returns.

Japan Using Steel Cars

A predominating tendency in steam and electric railway enterprises in Japan to-day is to operate steel cars, instead of wooden ones. The imperial government railways department, too, has a plan to operate these, and investigations have been made into such items as cost and maintenance. The accompany-



Steel Bogie Car Nearing Completion

ing picture shows the finishing touches being put on some of the steel tram-cars now under construction at the Tanaka Iron Works, Shinkita-machi, Kita-ku, Osaka. Ordered by the Kobe municipality, they went into service as soon as the paint was dry.

Yokohama Specie Bank Opens New Quarters for Shanghai Branch

SHANGHAI'S crown of jewels is her Bund and the latest, if not the brightest ornament therein is the Yokohama Specie Bank building into which more than two score of manufacturers have poured their cornucopias of the best in modern building materials to make this structure unique. It is built for banking and every atom of it has been swerved and trained for that one purpose, the ready and immediate accommodation of its patrons. The exterior of a building is indicative of its stability, and the interior of its usefulness for while the Yokohama Specie Bank in its outward aspect bears testimony to the genius of Mr. Frank Collard of Messrs. Palmer and Turner, architects, so does the interior also in that it is just as admirably fitted to the business of banking as its exterior is a delight to the eye. Mr. Collard has succeeded in adapting many Japanese features to his general Neo-Grecian exterior design and the result betrays none of those messy lines that commonly crop up in buildings where an attempt is made to graft West upon East or *vice versa*.

The exterior of the bank, of Japanese granite, many stones of which went through the earthquake and fire of last September, forms a fine contrast with the black iron gates set in bronze and bearing bronze castings that depict the mask and arms of the ancient Japanese warrior, fitting guardians for a financial institution. These are not grotesque but have rather a Viking cast of countenance, and the castings bear evidence that British bronze founders have lost none of their ability in carrying out the artist's design no matter how exotic. The plain granite facing is continued throughout the interior

of the spacious portico which serves as the base of the classic Ionic fluted columns which run up the front to the main entablature of the building. Lining with the centres of the columns are ornate bronze lamp standards, the lamp itself being supported by groups of finely moulded figures that resemble both the ancient Egyptian and the modern Formosan aboriginal costume, and the effect of these Oriental touches in the bronze-work is heightened by the keystones of the window arches. These are sculptured granite

heads about six feet high with downcast eyes that seem to echo the placidity of the Buddha of old but which mayhap express only the calm resignation of the modern banker. These, as well as the bronze gates and lantern holders are of Mr. Collard's design and testify to the painstaking care with which he has rounded out the general idea of his design, mingling East and West in harmonious unity.

The following from the pen of Mr. John Lofting, architect and quantity surveyor, is an appreciation of the *ensemble* of the building:—

"The plain granite facing of this part is continued within around the spacious portico and the solid simplicity of it, whether the gates are shut or slid out of sight within the massive walls and piers, forms an efficient and impressive base to the pair of five-foot-diameter plain circular swelled columns which run right up the front to the main entablature. A sculptured Japanese mask with helmet is very happily introduced into the bold Ionic capital of each column.

"The colonnaded front is flanked each side with a pair of wide plain pilasters in low relief culminating in delightful fluted capitals. The severity of these plain columnar flanks is finely relieved by the flat oriel window set between the pilasters in each case, supported by the sculptured head (of antique Japanese origin) of the keystone of the arch below, and capped with a rich copper canopy head. The main entablature above the capitals is built up with a plain architrave and freize and a wide overhanging cornice.

"The wide-fenestrated perfectly plain storey above the cornice terminated on the sky-line in a boldly designed bronze cresting

of a shell motive which gathers upwards in the middle of the flag pole base with a daringly original but charmingly successful design comprising the Japanese sun-burst flanked each side by a large Phoenix, all flashing golden down the river.

"This new bank front on the Shanghai Bund is arresting not only for its bold originality but also for its impressive dignity. Such a happy combination in modern architecture is a very remarkable achievement."



New Yokohama Specie Bank Building which is Classed by Architects as One of Most Beautiful Structures on the Shanghai Bund

Entering the building between the marble columns that flank the doorways, one's attention is immediately arrested by the spaciousness of the great banking hall. It is impressive not only in size but in the absence of much of the grill work and ornamental brass that disfigures many modern financial institutions. In the Yokohama Specie Bank most of the business is done over the broad polished hardwood counters and only at the cashier's end is grill work used at all. The sweep of the counters is admirably set off by the great square columns of variegated marble that support the open beamed ceiling. These marble columns were brought out from England and their white and grey veining and mottling while relieving the severity of the interior design, are at the same time restful to the eye. Each is capped with black bronze in fine contrast with the white beams of the ceiling.

British manufactures enter largely into the construction of the bank which was erected by the firm of Messrs. Trollope and Colls (Far East), Ltd. The steel work was furnished by Messrs. Dorman, Long & Co., Ltd., and the steel casements by Henry Hope & Sons through Messrs. Duncan & Company, their Shanghai agents. The steel reinforcing rods are the product of Messrs. Monks, Hall & Co., Ltd., and the window glass came from the works of Messrs. Pilkington Bros., Ltd., through Messrs. Scott, Harding & Co., Shanghai. To the uninitiated, the amount of piping and electrical conduit work about a building such as this is appalling and it has taken no less than ten firms to equip this bank. The sanitary fittings are from Messrs. Shanks & Co., agent Mr. A. Malcolm. The cast iron rainwater piping with shoes and bends was supplied by the Self Engineering Company, while the



Main Banking Hall of Yokohama Specie Bank to which more than a score of manufacturers contributed in furnishing and equipping it along the most advanced artistic lines as applied to modern business purposes

This marble work was executed to the architect's design by Mr. H. T. Jenkins who has added considerably to his laurels achieved in many noteworthy British and colonial buildings. The terrazzo flooring is the work of a Shanghai firm, Messrs. Tankai & Company.

Another remarkable feature of the main banking hall is the lighting, the building not only being flooded with light from ample windows, but also is illuminated from above by a beautiful lantern light that covers practically the whole centre of the hall and sheds ample daylight into every corner of the great room. This lantern light was supplied by the British Luxfer Prism Syndicate, Ltd., whose Shanghai agent is Mr. A. Malcolm. The lights are from the British Thomson-Houston Co., supplied through Messrs. Innis and Riddle.

coated soil pipe was manufactured by Shaw (Glasgow), Ltd. The Farrington Works furnished brass sleeves and Messrs. Nicholls & Clark the solder and lead to tighten the joints. Burn Bros. (London), Ltd., supplied soil drain pipe and the Lion Foundry Co., Ltd., the cast iron rainwater piping with its shoes.

This new building is second to none in Shanghai as regards sanitary fittings which were made by Messrs. Dent & Hellyer, Ltd., the porcelain tubs being supplied by Messrs. Robert Roxborough (China), Ltd., agents for Twyford, Ltd., and other fittings by Mr. A. Malcolm, the product of Messrs. Shanks & Co. The door furniture and various ironmongery was supplied by James Gibbons through Messrs. Arnhold & Co., while window glass was brought in by Messrs. Scott, Harding & Co., from Messrs.

Pilkington Bors., Ltd. The heating and ventilating system was planned to temper as much as possible the humid summers and even more humid winters of Shanghai. It was furnished by Wheeler & Comyn Ching (Asia), Ltd., whose local representative is Mr. P. J. Miller who not only took full charge of the installation, but has made several "stand-by" tests to insure its perfect performance. Attention to every detail has been given by Messrs. Palmer & Turner, architects of the new Yokohama Specie Bank building, and every item has been selected with especial care even to the tubular flag-pole which adorns the top of the structure which is from Messrs. John Spence, Ltd., the Cuburn track and fittings, from Messrs. Carter & Aynsley, Ltd., and the floor springs by Mr. Robert Adams.

One great function of any bank is to keep inviolate the moneys and other valuables committed to its charge, and in respect to its strong rooms and general protective devices, the bank stands second to none. The folding treasury doors are by Messrs. Chubb & Sons Safe & Lock Co., while the Chatwood Safe Co., supplied the strong-room doors. The bookroom doors were supplied through Messrs. Arnhold & Co., Ltd., from John Tann, Ltd., and the fire-protective coverings for the vaults by the Carborundum Company. These carborundum blocks are probably the most fire resistant material in the world and are made in the great electric furnaces at Niagara Falls. In electrical fittings the conduits were supplied by the Electrical Conduits, Ltd. The centrifugal pump for additional fire protection was supplied by Messrs. Jardine, Matheson & Co., agents for Messrs. Merryweather & Sons, Ltd.

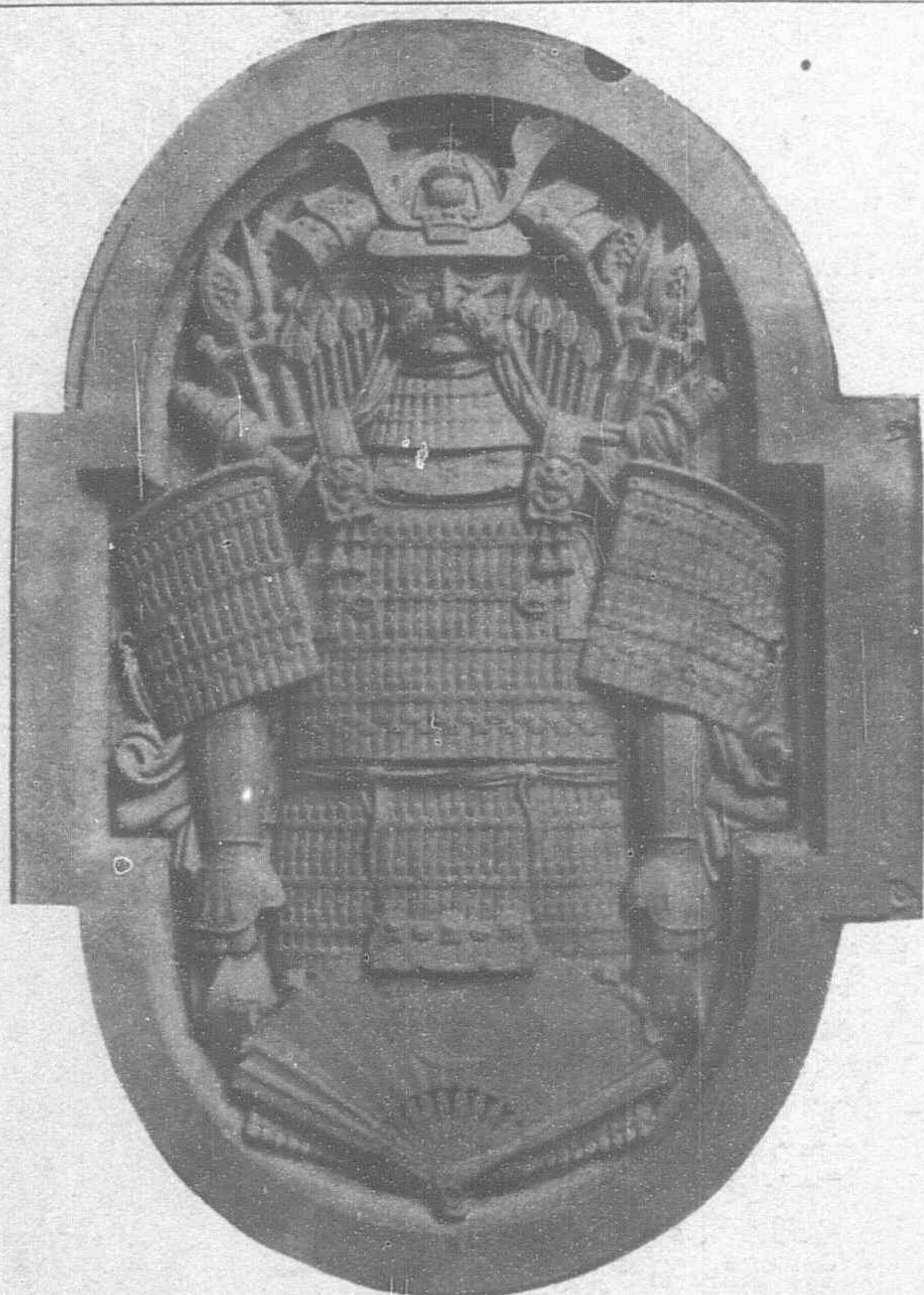


Magnificent Entrance with Bronze Gateways Cast by Crittall-Freeman Bronze, Ltd., London

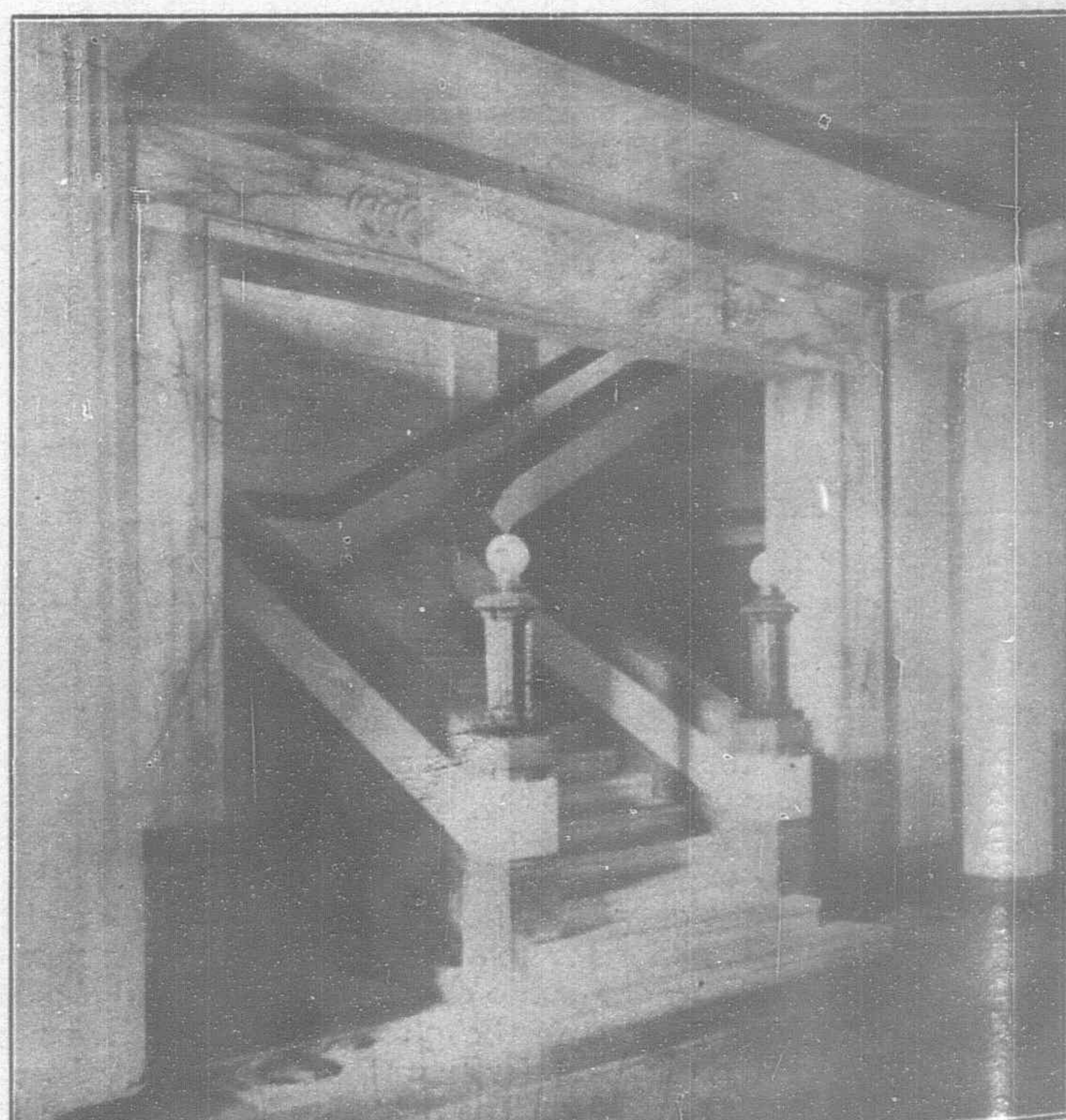
Many Shanghai firms took a leading part in the furnishings and fittings of this bank, among them being Messrs. William Jacks & Co., who furnished various items of hardware, R. N. Felgate & Co., who did the painting, while the timber and flooring was made by L. K. Taylor & Co. Some excellent joinery work was done by Arts & Crafts, Ltd., and furniture by Tai Chong. The counters were made by V. K. Shen & Son.

Above the glass dome of the banking hall is a light well extending to the roof of the building and around this are grouped various offices, board rooms, etc. The yare skillfully arranged so that every office is easily accessible and has a maximum of light. Access to the upper stories is by wide staircases handsomely balustraded in marble and by three Otis lifts, spacious ones of the latest American pattern supplied by the American Trading Company. These are of the "micro" drive type in which a clever device is used to prevent an unskilled operator stopping the carriage other than on an exact level with the floor. The same scrupulous attention to details has been shown in these upper floors as in the main banking hall and they are given every modern appliance in sanitation, heating and ventilation.

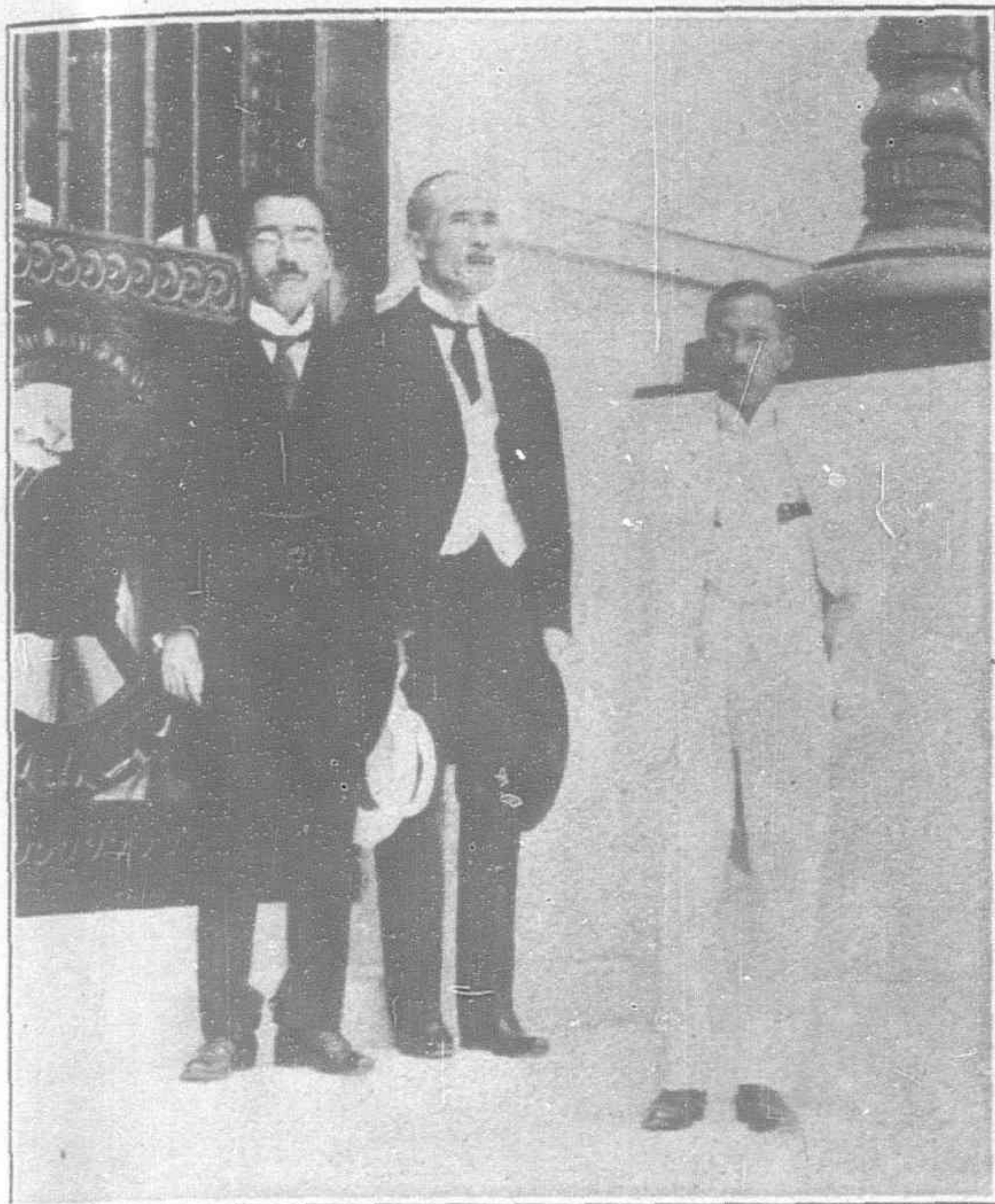
It was 31 years ago, May 15, 1893, that the Yokohama Specie Bank first opened its doors in Shanghai using temporary premises at No. 11A Nanking Road. Early the next year the bank removed to No. 21 The Bund, premises now occupied by the Netherlands Trading Society. The outbreak of hostilities between China and Japan in September, 1894, necessitated the temporary suspension of the bank's business at Shanghai, and such affairs as were outstanding were left to the care of the Comptoir National d'Escompte de Paris in Shanghai. At the termination of the war, the bank resumed its business here, re-opening its offices in July, 1895.



Ancient Japanese Warrior in Mask and Winged Helmet who Guards the Gates of the Yokohama Specie Bank (Shanghai Branch)



The Marble Stairway Leading to the Upper Stories of the Bank



Bank Officials present on the opening day (from left to right): Mr. G. Hashidzume, Manager, Shanghai Branch; Mr. M. Odagiri, Director, in charge of China Branches; Mr. N. Igarashi, Director

The business of the bank increased and as greater accommodations were needed, the bank purchased the property No. 31 The Bund, to which its offices were transferred on September 1, 1900. On December 1, 1902, the bank issued its first bank notes, and as the branch went steadily ahead during the years following, in September, 1911, was purchased the property on The Bund, known as the David

large majority of bills of lading and documents in Japan-China trade pass over the counter of the Yokohama Specie Bank. But the Bank has a wider and more important function than the mere discounting of bills. Only Mr. Hashidzume could say how many business endeavors the bank has brought to fruition with profit for all three, buyer, seller and banker. Lacking the active assistance of the bank, the business would have languished or "died a 'bornin'" despite that two of the factors, buyer and seller, were agreed. Probably no factor in Far Eastern diplomatic or business circles has been of more potency in bringing about friendly relations between China and Japan than the Yokohama Specie Bank. It is not easy to cherish a spirit of enmity against the man, institution or country that enables one to make a living and that is exactly what the bank has helped tens of thousands to do. Therefore, despite the diplomats, who sometimes cloud the issue, the Yokohama Specie Bank has been one of the strongest factors in bringing about peace and friendship, through just dealings, between China and Japan.

Avery's Wembley Exhibit

Visitors to the British empire exhibition will find much of exceptional interest in the varied selection of weighing, counting and testing machines exhibited by the pioneers of the scale making industry; Messrs. W. and T. Avery, Ltd., whose Stand No. 135 will be found in the palace of engineering.

The stand itself is of unique design, and consists of a weighbridge of remarkable construction, as visitors step on to the stand, their weight is visibly recorded on dials which form part of the office building in the centre of the stand.

Another innovation never attempted before, is the Avery electric weigher. This machine also records at the entrance hall of the palace of engineering the weight of every person stepping on the stand. This machine has been specially designed for commercial use, for checking and controlling weighings which are being made at a distance.

Automatic counter scales will appeal specially to grocers, bakers, confectioners, dairy men and allied trades.

Special models are designed for different markets, and the makers are in an excellent position to advise overseas buyers in the big modern question of automatic weighing.

There will be an interesting selection of all classes of weighing appliances including automatic machines suitable for weighing grain, etc., in docks, silos, mills and granaries; platform machines for plantation and warehouse work, and for bulky packages and travelers' luggage, etc., and weighbridges suitable for weighing railway and motor traffic.

Other exhibits will include counting machines in great variety. These machines count as well as weigh, and are in great demand on account of their accuracy and labor-saving achievements. These mechanical accountants speed up output, and are a great boon in thousands of factories all over the world.

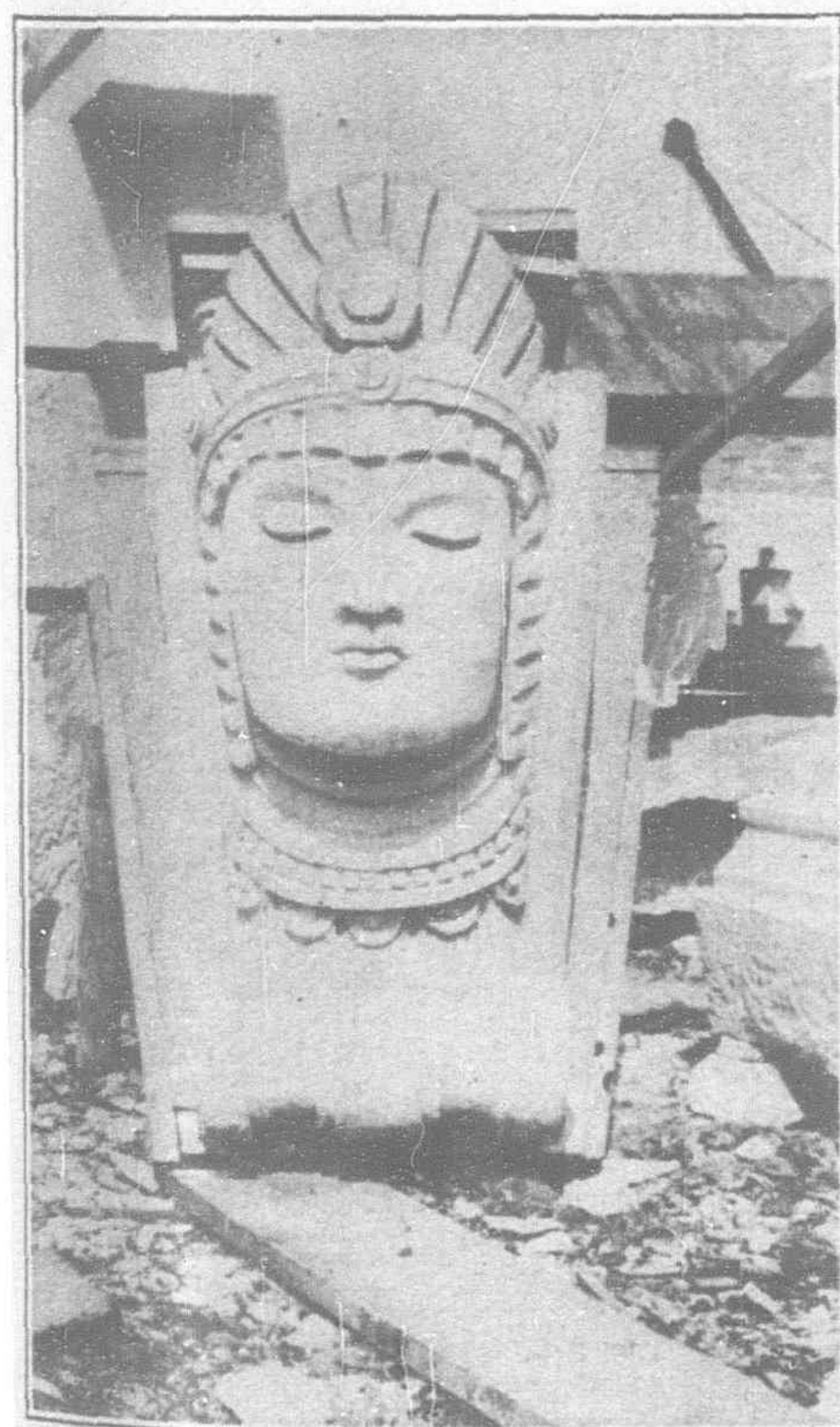
The manufacture of small parts, the man engaged in repetition work, the merchant handling thousands of grosses of little articles, the estimating or costing department anxious to calculate costs quickly from the single specimen and to quote in grosses or thousands—all these have learned to appreciate counting machines. One of the chief causes of delay in the output of a factory dealing with small repetition work, was just the lack of an instrument which would facilitate the accurate counting and distribution of these articles manufactured in thousands and at a high speed in the machine rooms, and this great efficiency Messrs. Avery supply, thus, as it were, oiling the wheels of industry, saving time, and economising in labor.

There will also be testing machines to test specimens representative of a bulk of material, also machines for carrying out tests for hardness. Testing machines for making tests in all directions are now a feature of this firm's manufacture.

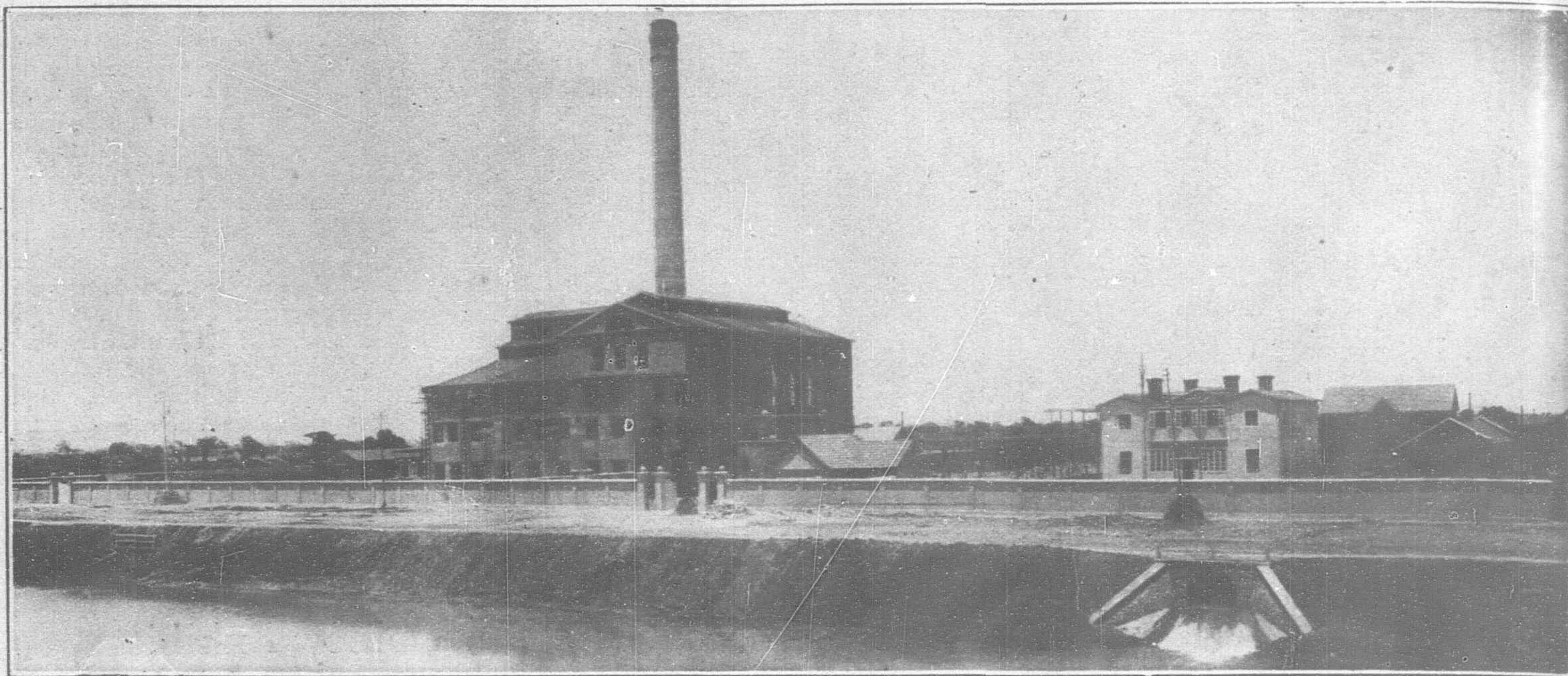
Sassoon Building, on the site of which the present magnificent new structure stands.

The formal opening of the new building on July 19, was attended by many notables in Shanghai official and business circles. Consular officials and the leading businessmen of the city assembled to toast the long life and prosperity of the institution which now was housed in quarters befitting its importance. Among the officials of the bank who attended the opening of the new building were Mr. Masunosuke Odagiri, director and manager of the China branches of the bank and Mr. N. Igarashi, also a director. Mr. Odagiri renewed his acquaintance with many old Shanghai friends who knew him when he was consul-general in Shanghai before he joined the bank, in 1906. Mr. G. Hashidzume, manager of the Shanghai branch, was warmly congratulated upon his success as a Shanghai financier in that he had brought such prosperity to his branch of the bank.

The Yokohama Specie Bank has had a long and honorable career, not only in Japan, where the bulk of its business is, but in Shanghai through which passes the major portion of Japan's trade with China. These two countries that are in such proximity are in great measure interdependent and it is safe to say that the



The keystone of the windows is a placid Buddha-like figure six feet high cut in granite from designs and wax model made by Mr. Frank Collard, of Messrs. Palmer and Turner, Architects of the Bank



Tseng Hua Electric Manufacturing and Power Co.—View of Power Station from South Side

China's First Long-Distance Power Line

Wusih-Changchow 33,000 Volt Transmission System Constructed by Siemens China Co.
for Tseng Hua Electric Manufacturing and Power Co.

By R. Kleemann of the Siemens China Co.

THE Tseng Hua Electric Manufacturing & Power Co. was started by a group of Chinese industrialists with a view to manufacturing electrical machinery and apparatus in China. The attempts hitherto made in this direction in the different parts of the country have not resulted in establishing a manufacturing industry of any importance and the promoters of the Tseng Hua Co. were well aware of the difficulties arising for a factory from the peculiar conditions of the electric machinery business in this country, the lack of raw materials, the need of creating a working staff and many other questions that have to be considered in starting a new enterprise of this kind. For facilitating designing work, factory management and with a view to friendly co-operation they made an arrangement with the German Siemens concern which is represented in China by its affiliated Siemens China Co.

The management of the Tseng Hua Co. in an endeavor to secure for their shareholders an investment that should bear interest, as soon as possible, decided to establish a power station before the manufacturing was begun as a power station supplying electricity to the public would be a revenue-producing plant from the beginning, whereas a manufacturing plant would require some years before returns could be expected. Therefor the company applied for and obtained a concession for a power station for the supply of electricity in the Wusih-Changchow district and built the power station which has now been operating since the beginning of the year.

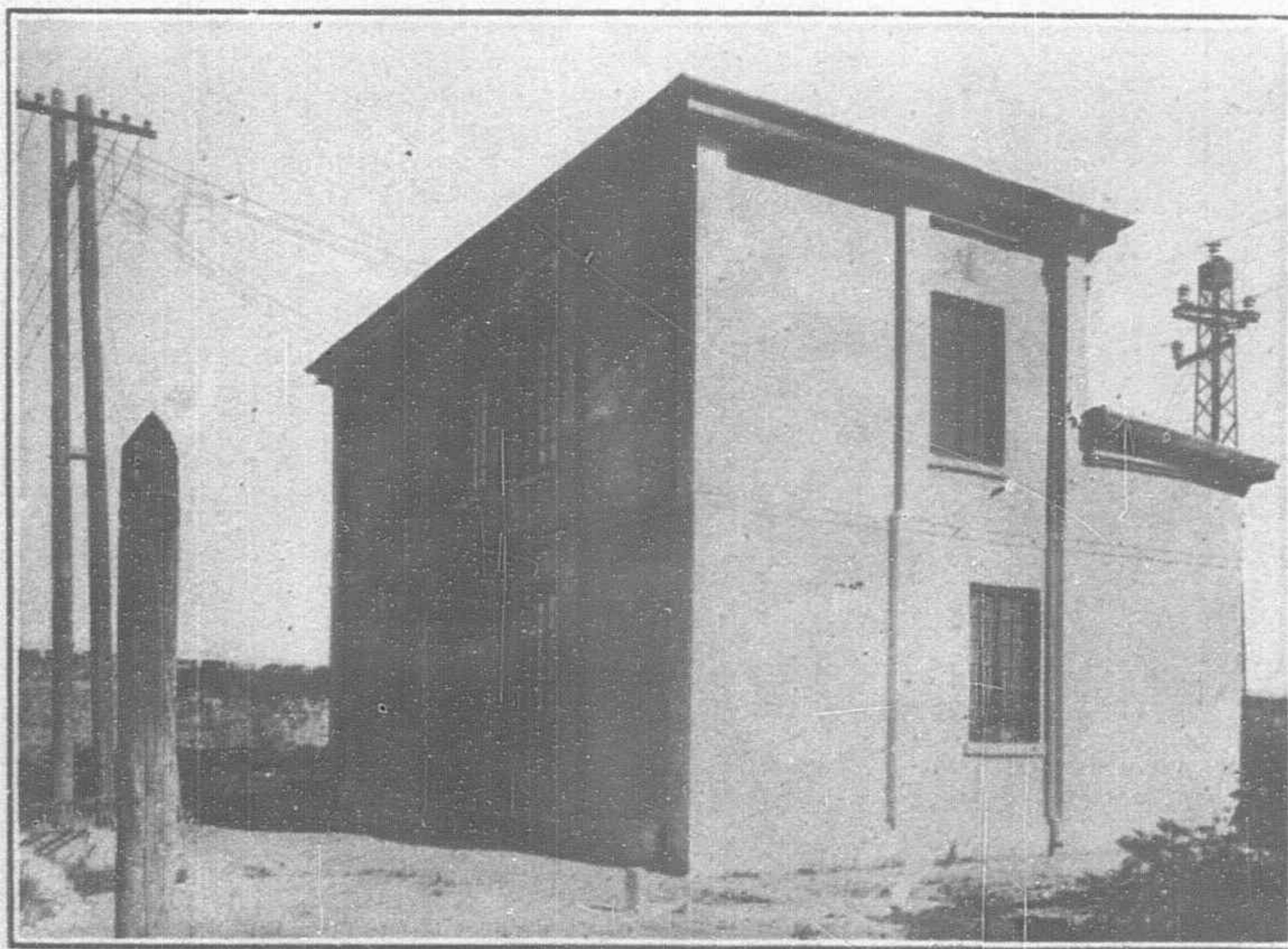
The following is a detailed description of the various sections of the plant:—

The Power Station at Tsishuyen

THE SITE AND LAY OUT OF THE BUILDING.—The choice for the power station site fell upon a place between Changchow and the village Tsishuyen. This had the advantage of railway connection as it is between Tsishuyen and the power plant. Sampans for coaling also can be berthed in the immediate vicinity. The substrata of compact clay gave little trouble. The buildings were designed by the Siemens China-Construction department and built by the Fushing Engineering & Construction Co., Peking and Shanghai.

The main building, comprises the boiler-house, auxiliary engine-room, turbine, switchgear and transformer-rooms. The plan and section of the building illustrate the general arrangement of the various rooms. The boiler-house consists at present of two bays each with two rows of boilers. The length of the boiler-house is 14.5 metres, the total breadth 34 metres, the height under the roof is 21 metres. The chimney, constructed in reinforced concrete, is 64 metres high, with an inner diameter of 3.6 metres. In view of the possibility for the extension at some future date, ample allowance was made for a second chimney and for the accommodation of coal-bunkers and ash-conveyors.

The auxiliary machine-room adjoining the boiler-house has one bay of about 34 by 4

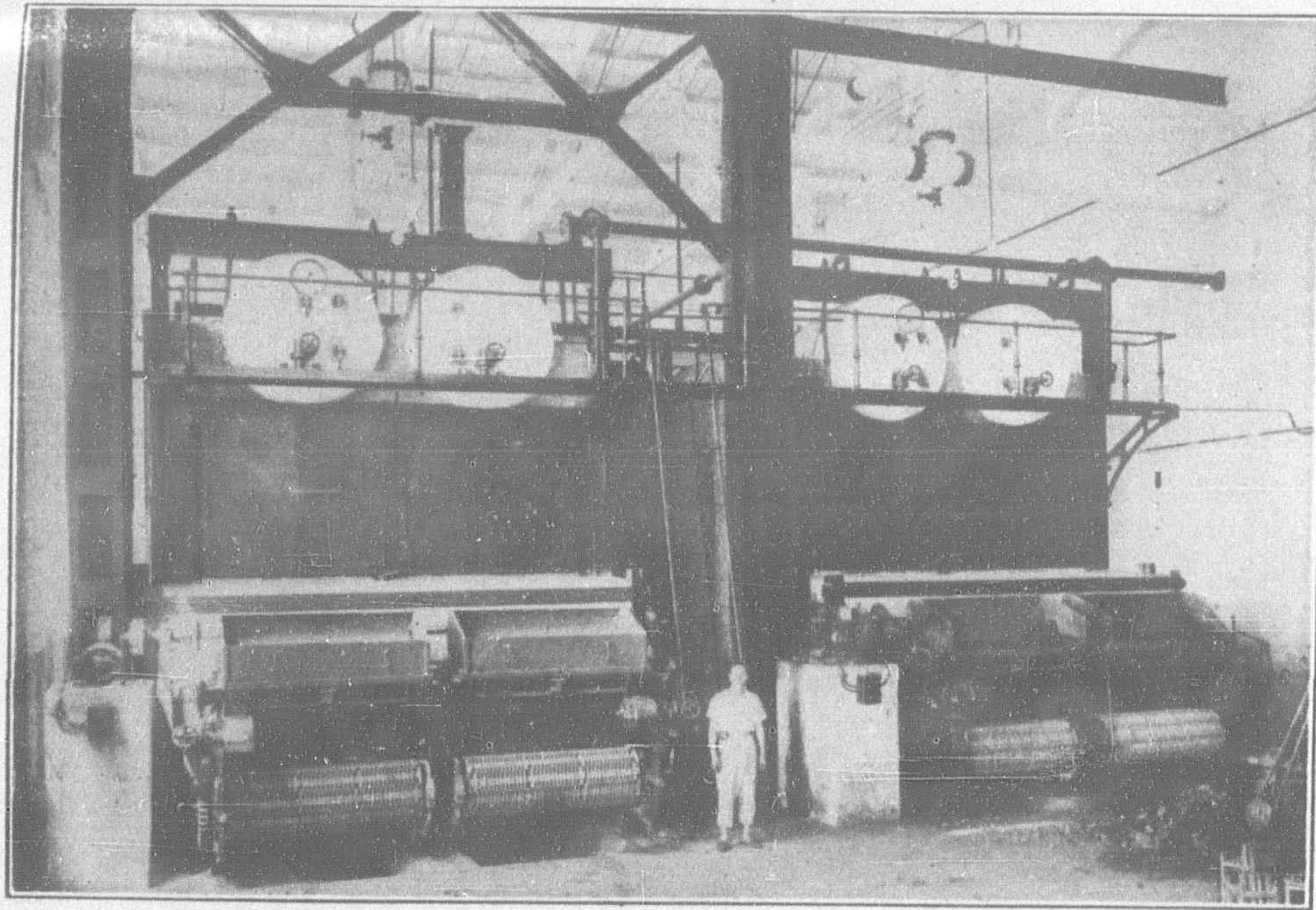


Main Substation at Changchow

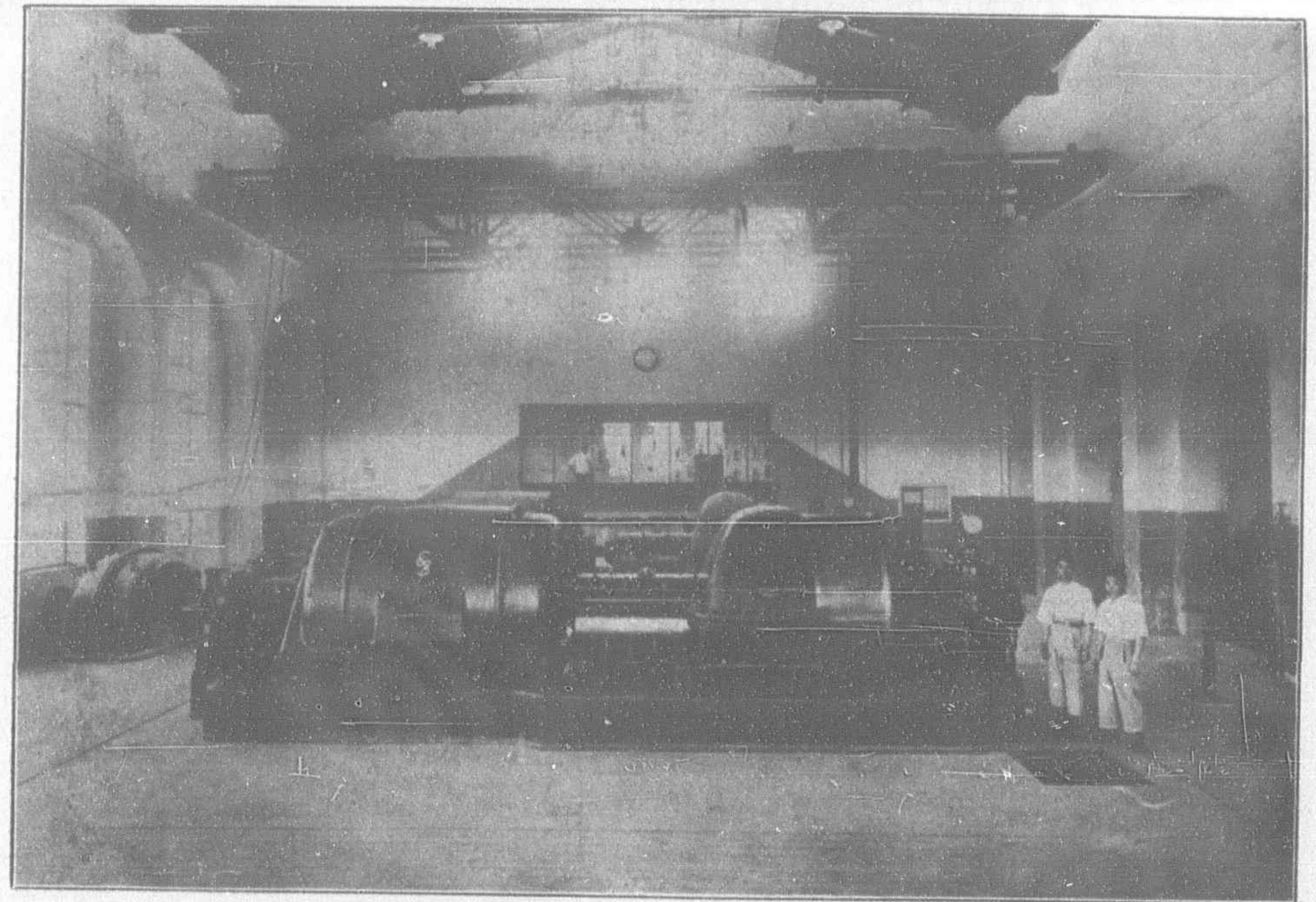
GENERATING APPARATUS OF TSENG HUA ELECTRIC POWER PLANT

September, 1924

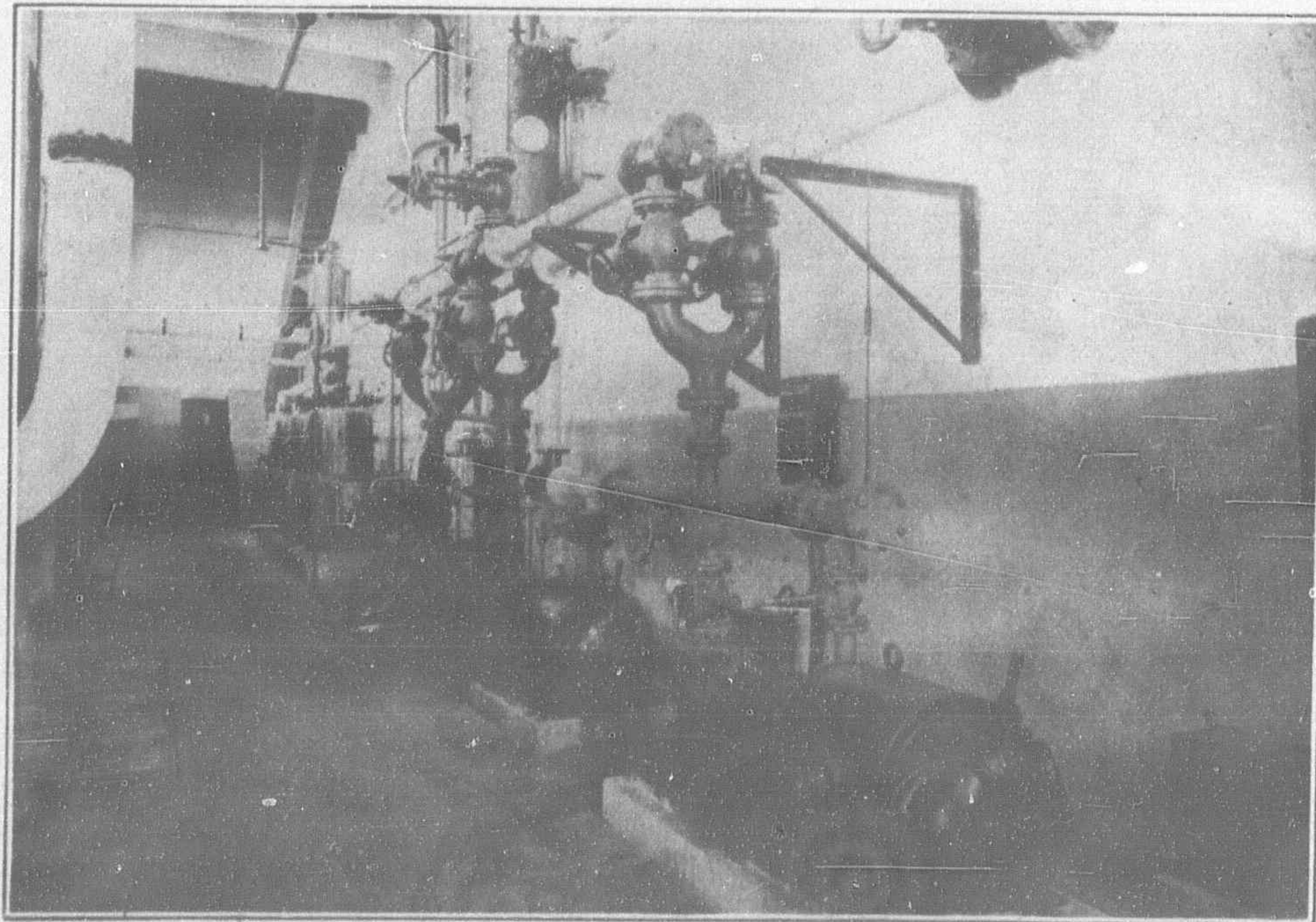
THE FAR EASTERN REVIEW



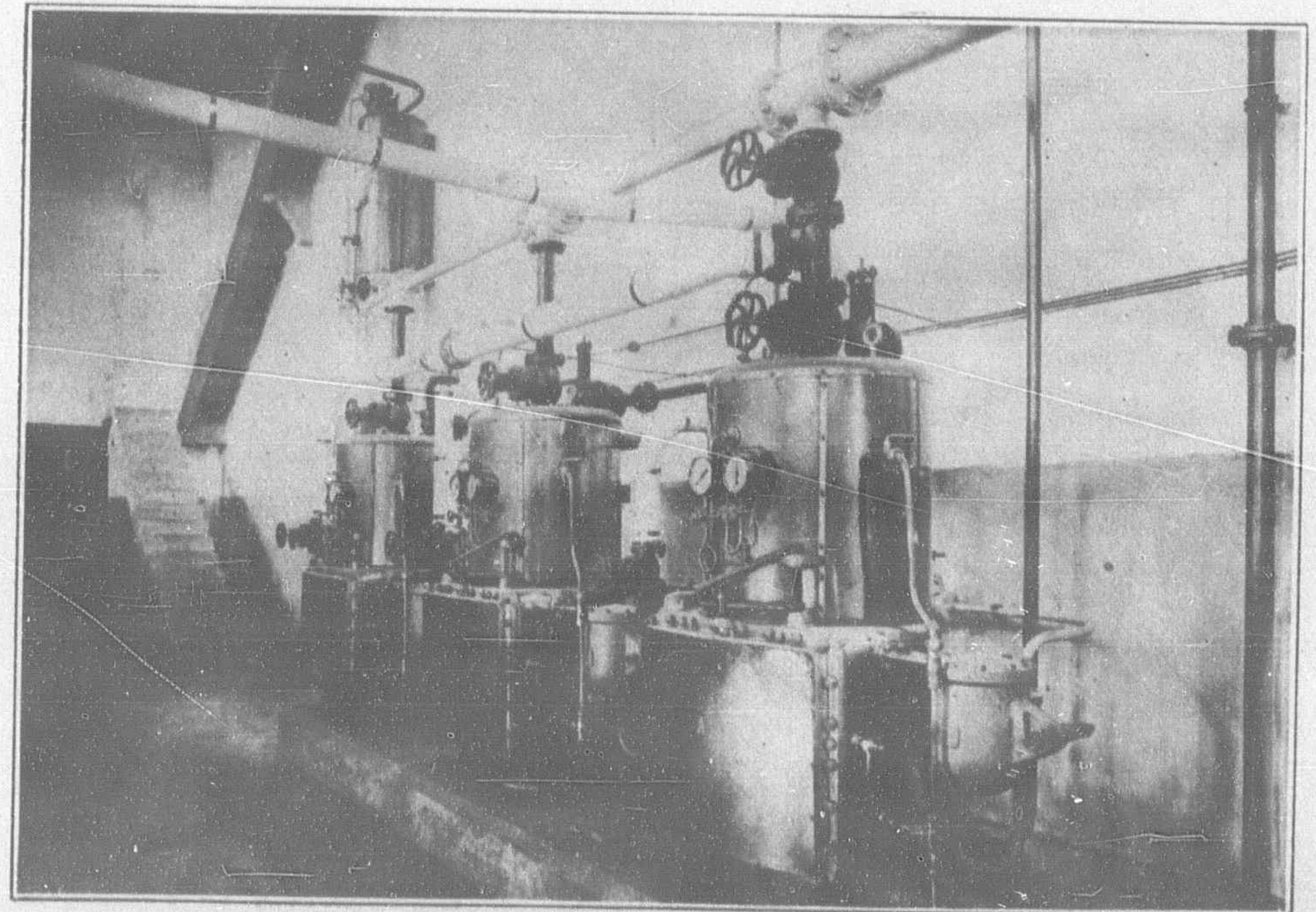
Boiler House with Babcock and Wilcox Boilers, Green Economisers



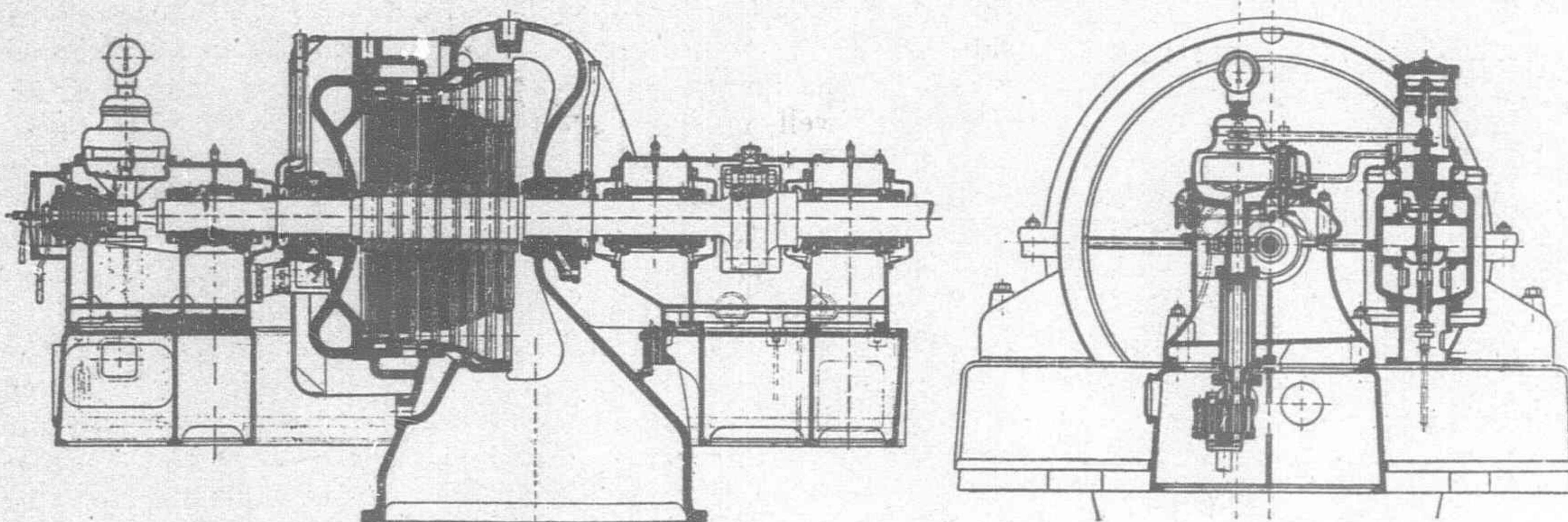
4,560 H.P. Zoelly Steam Turbines Coupled to 3,200 K.W. Siemens-Schuckert Generators



Auxiliary Engine Room Showing Evaporator and Electrically Driven Feed Water Centrifugal Pumps by Pumpen and Armaturenkoncern (Frankenthal) and Weise Sohne (Halle a.d. Saale)

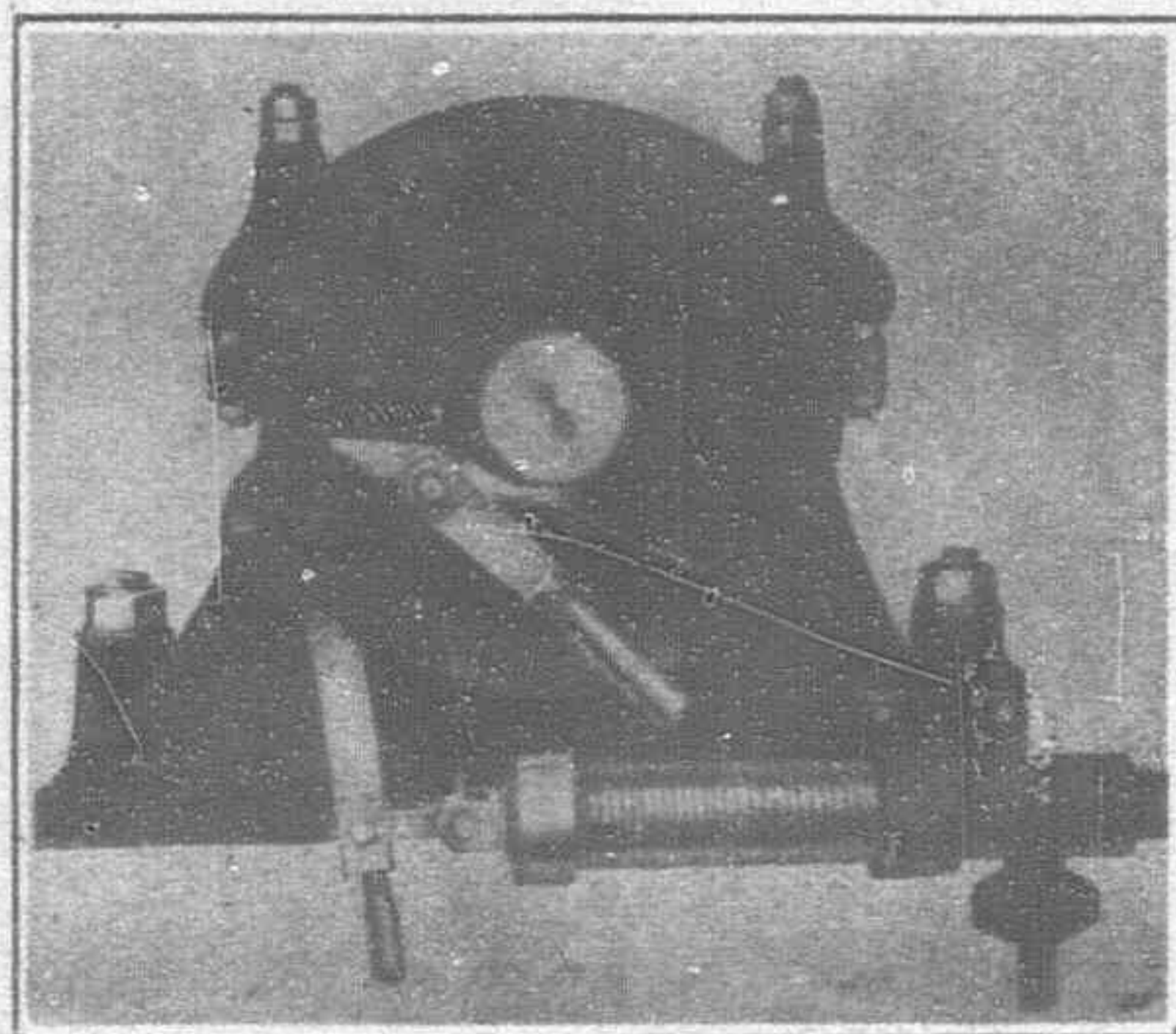


Battery of three Atlas Werke (Bremen) Evaporators Distilling Water for use in Steam Plant, to Supplement Supply from Condensers



Longitudinal Section through Turbine—On Right is shown the Throttle Governing the Turbine

metres area. The structure is heavy as the upper storey has to take the weight of two iron tanks. The supply duct for the cooling water lies under the pumps at a depth of about 7 metres under ground. The first floor, 4 metres above ground level, contains the evaporators and feed pumps; above these at a height of 12 metres are the feed water tanks.



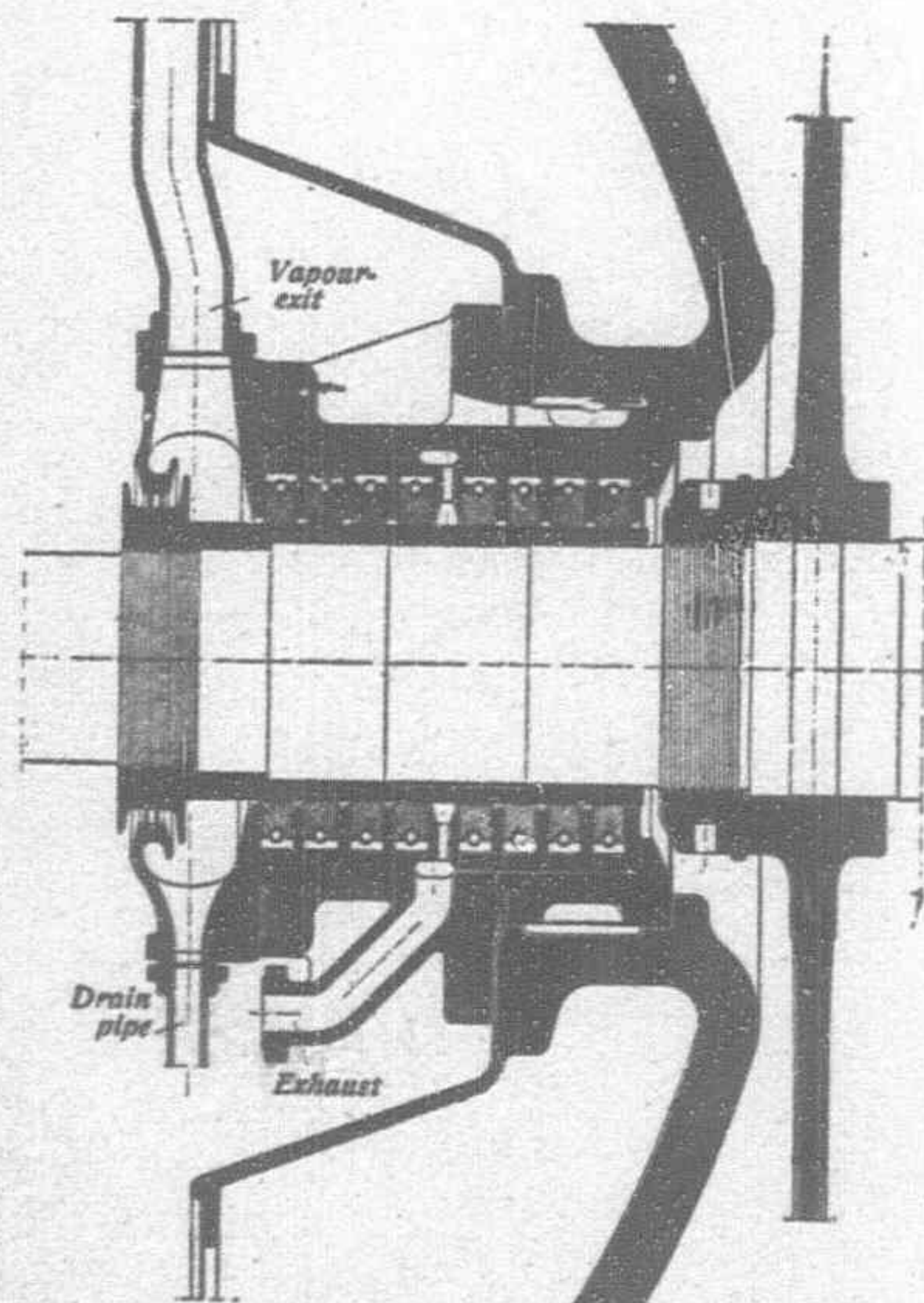
Quick Closing Gear

From the first floor of the auxiliary machine-house a stairway 2.6 metres in height leads to the adjoining engine-room which contains the first power unit, two Zoelly steam turbines of 4,560 h.p. each. The engine-house has an area of 34 by 16.4 metres and a height of 23 metres. Columns form the main support of the structure and also carry the engine-room crane rails. The eastern and the northern fronts of the power house are provided with rows of large windows. The ground floor contains the condensers and air filters, arranged between the turbine foundations. The cooling water outlet duct runs along the eastern front of the building.

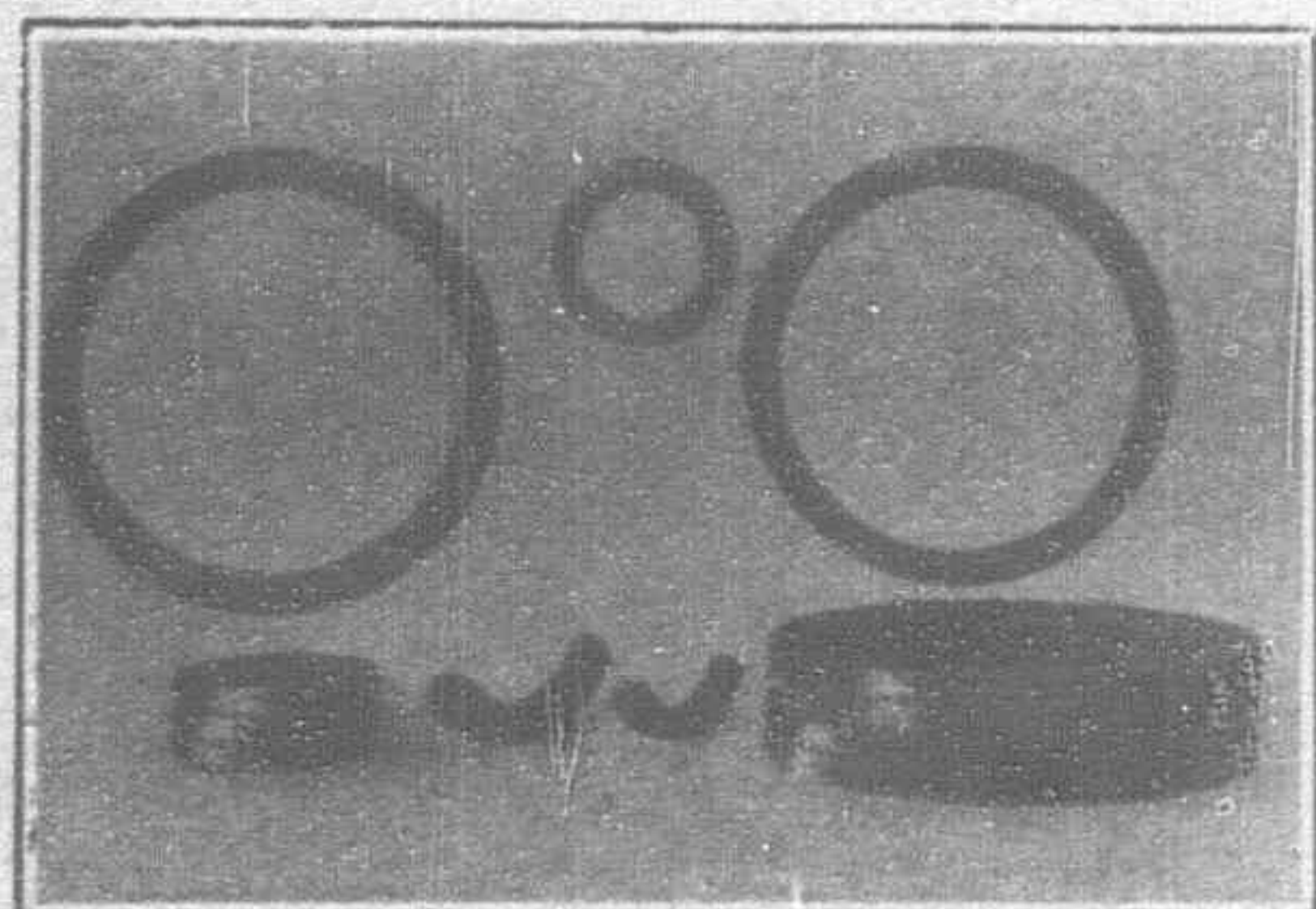
The switchboard-room is reached by two sets of stairs from the engine-room. It has an area of 35 by 28.5 metres and forms the communication to the adjoining busbar-room, containing the 6,600 volt and 33,000 volt-switchgear. The switch plant is a two-storied building. It contains in the ground floor the cells for the transformers. Full description of the switchgear will be given when describing the electrical plant. The whole of the plans were laid out with a view to future extension on a large scale.

The Boilers and Auxiliary Machinery

The steam plant consists of four water tube boilers supplied by Messrs. Babcock & Wilcox Ltd., Glasgow, each with a heating surface of 419 sq. m. and a steaming capacity of 10,500 kg. per hour at 15 atm. and 360° C. superheat. All boilers are fitted with automatic chain grate stokers. The boilers consist of a number of individual

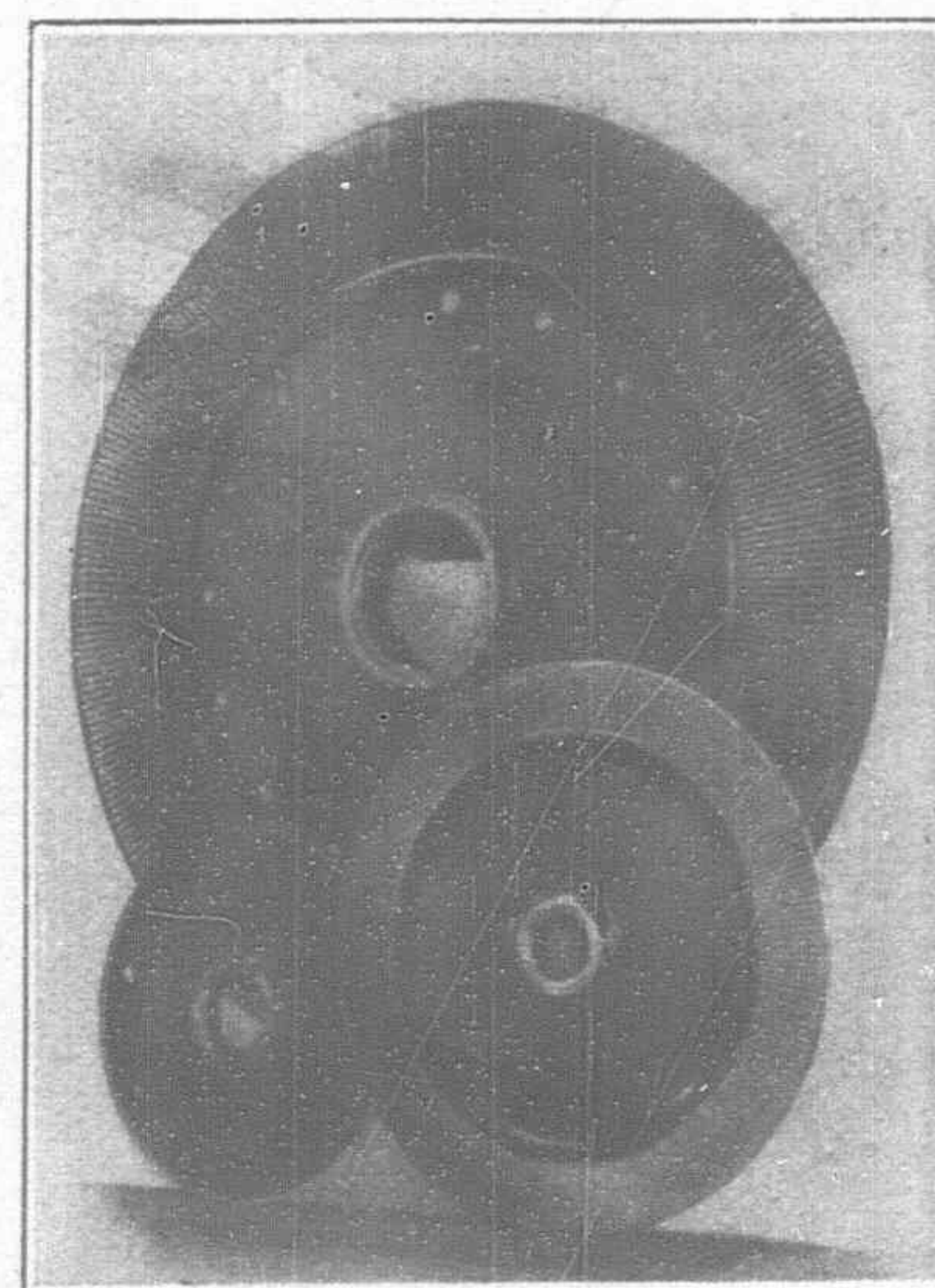


Section Through Stuffing Box



Carbon Rings for Stuffing Box

are installed each with a total heating surface of 248 sq. m. The boiler feed water is taken principally from the condensers. In order to compensate for losses, evaporators were installed. For water supply and storage of feed water two iron tanks are installed in the upper storey of the auxiliary machine-house.



Turbine Runner Wheels

The feed water tank takes the turbine condensate as well as that from the evaporators. From the feed water tank the water flows to three feed water pumps installed below, two of which are intended for daily use and electrically driven, the third being driven by steam. The electrically driven pumps are centrifugal pumps by Messrs. Pumpen and Armaturenkoncern, Frankenthal and Weise Sohne, Halle and den Salle. They are capable of conveying 50 cubic metres water against a pressure of 175 metres and at 2,900 r.p.m. The pumps are driven by direct coupled a. c. motors of 55 h.p. at 380 volts. In order to insure the continuity of the feed in case of failure of the electrical supply, the third pump is actuated by a steam turbine of 150 h.p. at 3,850 r.p.m. It was supplied by the Maffei-Schwartzkopf Works, Berlin, and delivers 100 cubic metres against a pressure of 175 metres.

The evaporator plant, which furnishes the auxiliary boiler supply consists of three evaporators delivered by the Atlas Werke, Bremen, with a total capacity of 2,000 kg. distilled water per hour. They are heated by live steam from the boilers. The condensation of the distilled water takes place in the feed water tank. The untreated water required by the evaporators and for cooling purposes is taken from another tank situated in the upper storey. One electrically driven centrifugal pump is installed in the basement of the auxiliary machine-room to convey the untreated water from the water inlet channel to the tank above.



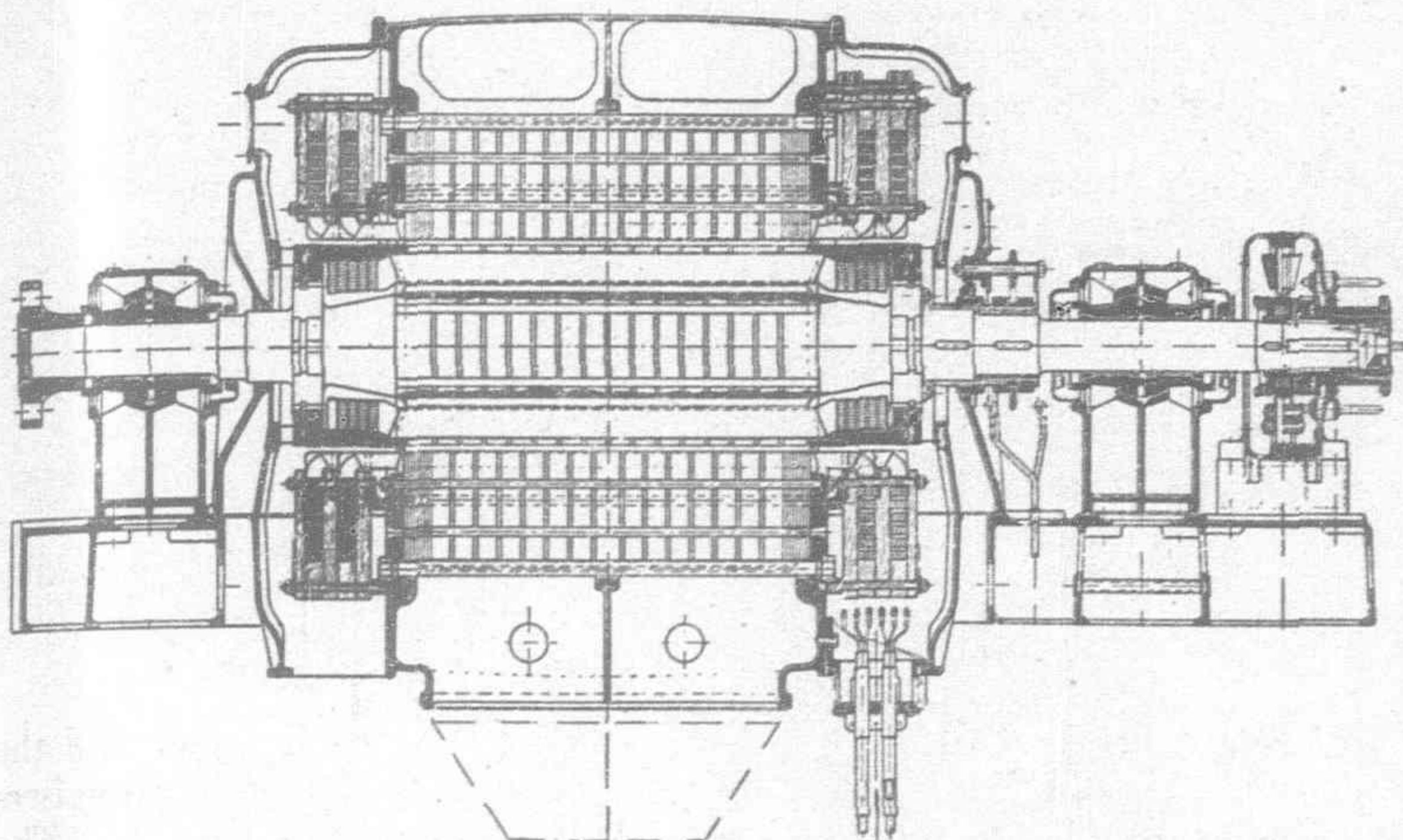
Gear Wheel Oil Pump

The Turbines and Condensing Plant

The first installation consists of two turbine sets with Zoelly steam turbines for 4,560 h.p., and three-phase alternators for 3,200

layers of tubes fitted together, one above the other. The superheater consists of serpentine steel tubes with a total surface of 122 sq. m. It is inserted between the water tubes and the drums. The various elements are carried by a self-supporting iron frame work, which is filled up with masonry. The facings are provided with doors for cleaning and inspecting the boilers. Generally speaking the boiler plant presents nothing calling for special mention.

Between each boiler and the chimney flue Green economisers are installed each with a total heating surface of 248 sq. m. The boiler feed water is taken principally from the condensers. In order to compensate for losses, evaporators were installed. For water supply and storage of feed water two iron tanks are installed in the upper storey of the auxiliary machine-house. The feed water tank takes the turbine condensate as well as that from the evaporators. From the feed water tank the water flows to three feed water pumps installed below, two of which are intended for daily use and electrically driven, the third being driven by steam. The electrically driven pumps are centrifugal pumps by Messrs. Pumpen and Armaturenkoncern, Frankenthal and Weise Sohne, Halle and den Salle. They are capable of conveying 50 cubic metres water against a pressure of 175 metres and at 2,900 r.p.m. The pumps are driven by direct coupled a. c. motors of 55 h.p. at 380 volts. In order to insure the continuity of the feed in case of failure of the electrical supply, the third pump is actuated by a steam turbine of 150 h.p. at 3,850 r.p.m. It was supplied by the Maffei-Schwartzkopf Works, Berlin, and delivers 100 cubic metres against a pressure of 175 metres.



Longitudinal Section Through Generator

k.w. output each. The interior of the engine-room as illustrated shows only one set. The turbines were built by Friedr. Krupp, Germaniawerft, Kiel. The above output corresponds to a steam pressure of 14 kg. cm. (200-lbs. sq. inch) at a temperature of 350 centigrade at the inlet valve. The steam consumption of one turbine at full load can be supplied by two of the above-mentioned boilers.

The turbines are impulse turbines and the principle on which they work is that the steam compounds solely in the stationary part of the turbine, in the guide wheels, so that differences of pressure in the blades of the runner wheels and consequently steam losses in the gaps between the two sets of wheels and axial thrusts are non-existent. The high-pressure live steam, after passing the governor valve, enters the turbine at an annular channel arranged in the end of the casing and is led from there to the blades of the first guide wheel. Here the pressure of the steam is reduced and its speed raised, its pressure energy being thus converted into kinetic energy. This first alteration is so chosen that the steam pressure behind the first guide wheel is reduced to about one-half of the admission pressure while the velocity has risen to about 450 metres a second. The purpose of the runner wheel, into which the jet of steam enters after emerging from the guide blades is to transmit the energy with as little loss as possible to the turbine shaft. The steam jet impinges on the blades of the runner wheel at a suitable angle and is thus diverted from its path. The resultant back pressure on the surface of the runner blades is converted into circumferential force, so performing work. During this process the pressure of the steam in the runner wheel remains unaltered, while its velocity decreases. The steam then enters the second guide wheel, where a similar process takes place and so on through a number of stages until the pressure has reached condenser level.

As the steam pressure at the entrance to each guide wheel is the same as that at the exit of the preceding one, it follows that the runner wheels of the turbine rotate in regions of constant pressure. Therefore it is impossible under ordinary conditions for the runners, as is the case with reaction turbines, to exert an axial thrust. Only in the event of sudden and violent fluctuations of the load would it be possible for a small difference of pressure to occur at both sides of each runner. In order to prevent the possibility of even such an occasional occurrence the runner wheels are provided with openings.

The fact that the pressure on both sides of the runner wheels is equal, permits the employment of ample clearance between these and the adjacent stationary parts of the turbine, viz., the casing and the guide wheels. This circumstance is of the greatest importance as regards safety in running in view of the high velocities of the runner.

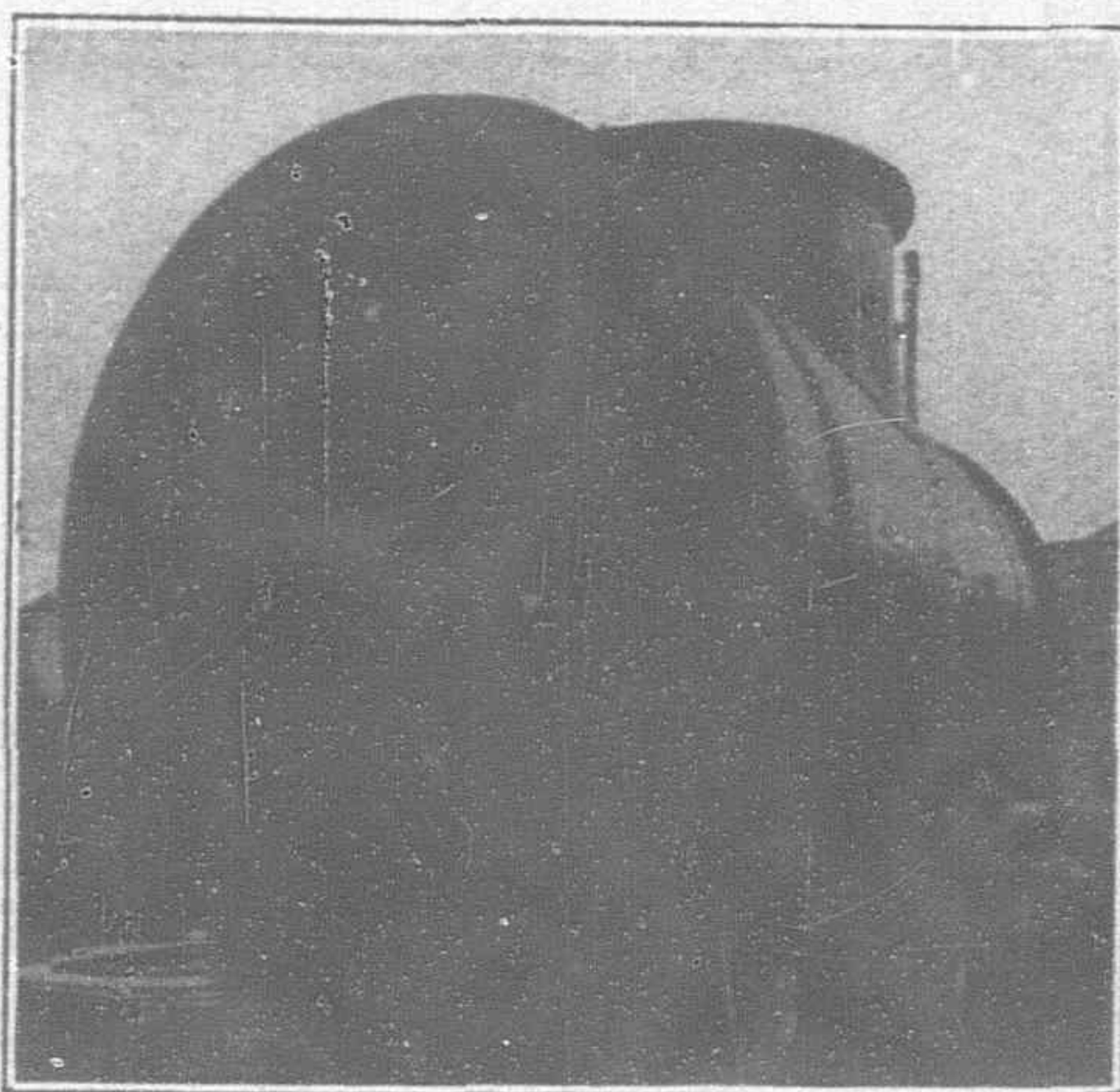
The runners are secured to the shaft by means of collars. This method of fixing prevents the runners from rusting to the shaft and facilitates their removal. The bearings are entirely separate from the casings in order to prevent the transmission of heat from

the latter. A thrust bearing is provided on the high-pressure side, the function of which is to keep the shaft and runner wheels in the necessary fixed position in relation to the guide wheels, as well as to the generator. As a matter of fact, the actual thrust on the bearing is practically negligible, the impulse turbine, for the reason already explained, being free from axial thrust. The thrust bearing is so arranged that it moves freely, corresponding to the expansion of the turbine, and thus preserves the distances between stationary parts.

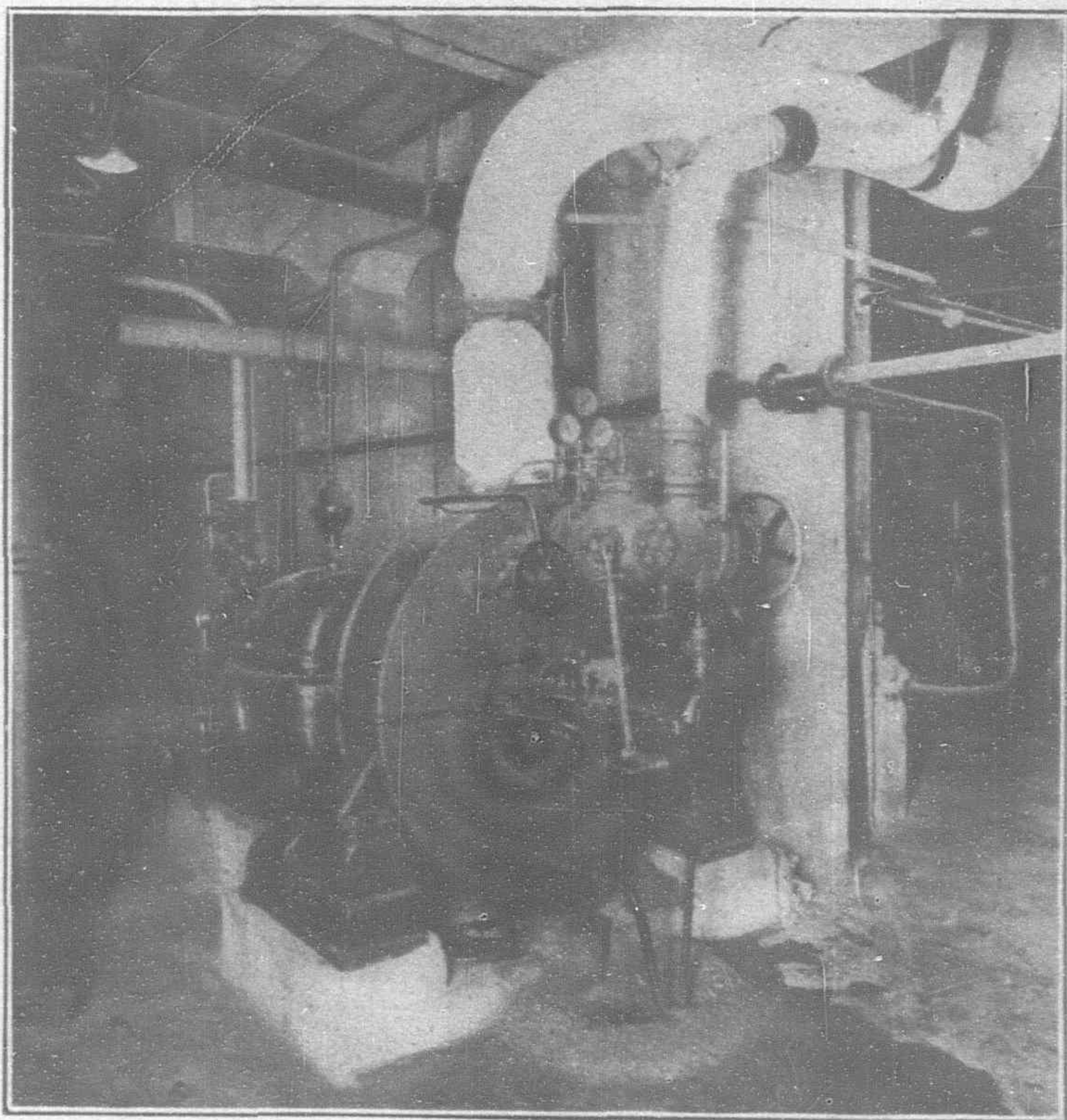
The bearing on the low-pressure side is united with the neighboring generator, bearing a common standard, which encompasses the coupling of the rigid pattern type built in between the two bearings. This arrangement of the bearings has not only the advantage that the bearings, but also the turbine stuffing boxes are easily accessible. The generator bearing at the exciter end is of the same construction as the others. All bearings are lubricated and cooled by pressure oil supplied from a common gear-wheel pump and fed through suitable distribution piping. The turbine housing is split along the horizontal axis, so that on the removal of the upper half the runner wheels are laid open for inspection. It is supported on the baseplate by low and amply dimensioned feet, but is only bolted to the baseplate in the neighborhood of the exhaust steam outlet, so that movements due to expansion shall not be transmitted to the condenser, and to allow freedom for expansion in all directions.

The head end of the turbine casing is convex and contains an annular chamber for the distribution of the steam. The relative positions of the turbine casing and the first guide wheel are such that the high-pressure steam on entering the turbine acts only on the surface of the annular channel, while those portions of the end casing in the neighborhood of the shaft are merely subjected to the much lower steam pressure existing behind the runner wheel. The stuffing box is thus only required to act against comparatively low-pressure steam and is just as easy to keep in order as in the case of turbine with velocity stages. The packing at both ends of the turbine shaft is carried in stuffing boxes

cast on to the casing. They consist of a number of light carbon-rings which are made in several sections and pressed lightly on to the shaft by a spring. The rings require neither cooling nor lubri-



Condenser



Condenser Pump Set

cating, so that no contamination of the steam by oil can occur and the condensed water can be used for boiler feeding. In a very short time these rings acquire a highly polished surface and thus ensure entire absence from wear on the shaft. The carbon rings are free to move in axial and radial direction without affecting the efficiency of the packing, so that in this respect also, a very high degree of safety is ensured.

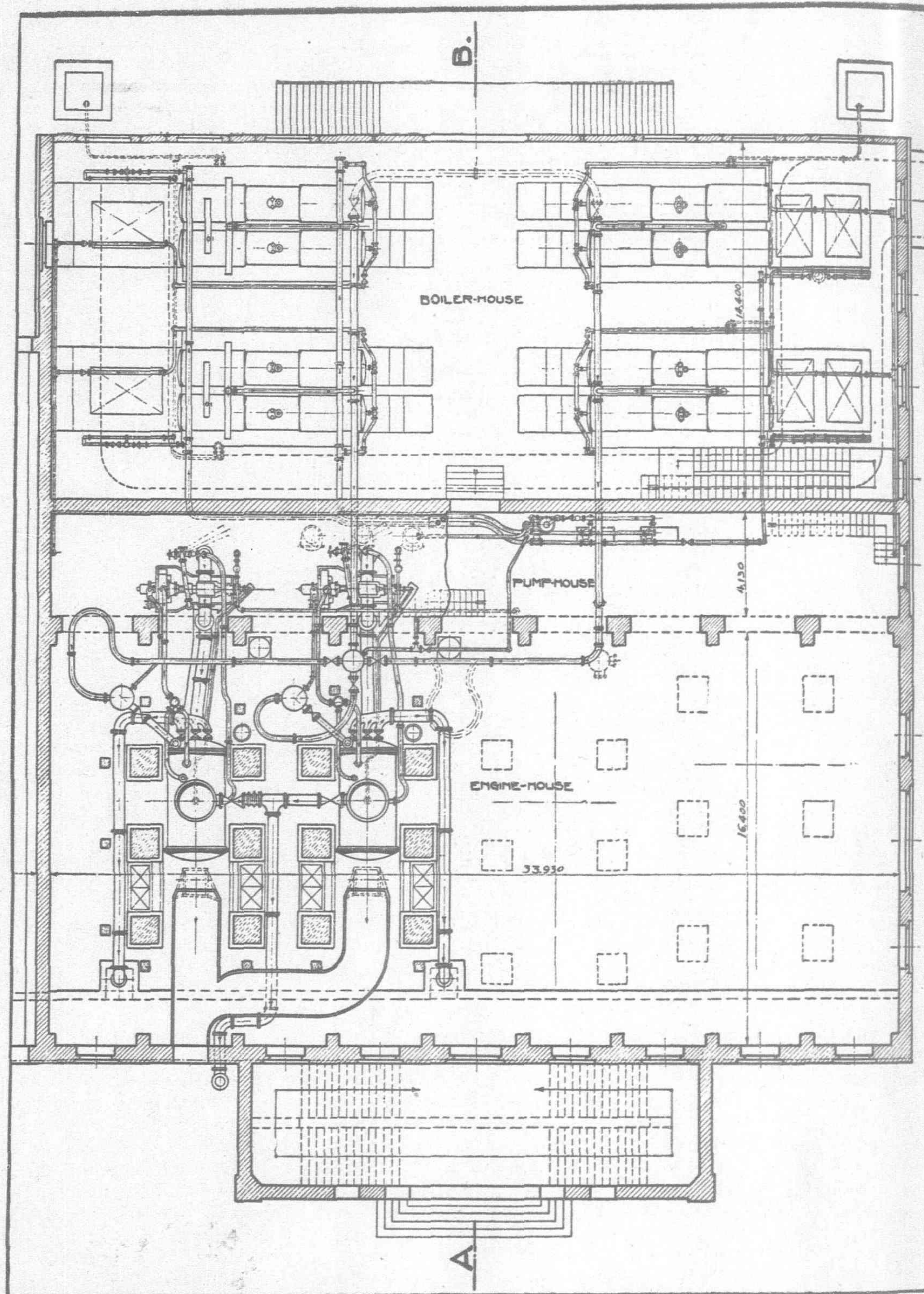
The shaft is turned with particular care from high-grade open hearth steel and so dimensioned that absolute freedom from vibration is ensured. This is attained by balancing each runner wheel separately and afterwards re-balancing the complete runner, and furthermore by the choice of such dimensions for the shaft that a wide margin is afforded between critical and normal running speed. The shaft is a so called flexible shaft, that means the normal speed of the turbine lies considerably higher than the critical.

The runner wheels are forged, together with their hubs, from a solid block and then turned down to the form of a disc of uniform strength. The special care taken in the machining of the runner wheels enables the inevitable losses caused by steam friction to be reduced to a negligible quantity. The rims of the wheels are provided with T-shaped machined annular slots, in which the runner blades are consecutively inserted but separated from each other by correspondingly shaped distance pieces. The runner wheels are mounted on the shaft with particular care, intermediate rings being employed, upon which the wheels are shrunk, while the rings themselves are fixed comparatively loosely on the shaft. The runner wheel blades, being the most important part of the turbine, are manufactured with the utmost exactitude.

The blades are designed as bodies of uniform strength, stouter at the base than at the tip. By this mean the centrifugal force and the stress on the critical section are greatly diminished. In order to prevent friction and eddy losses the blades are covered on their outer circumference by thin steel-strips rivetted to the blade-heads.

The guide wheels are cast iron discs, split horizontally and inserted into the respective halves of the casing. The hubs enclose the hubs of the runner wheels on the shaft. Loss of energy due to the equalization of pressure differences is easily prevented by the insertion of labyrinth packing between the hubs of guide and runner wheels. The nickel steel guide blades are cast into the rims of the guide wheels and become so firmly embedded that to break loose is impossible. The guide wheels and blades are then subjected to careful machining to ensure smooth surfaces and accurate sections of the steam paths.

Lubrication is effected by a gear-wheel pump of simple construction but great reliability. The oil is pumped from a special oil tank to the lubricating centres and passes on its return through

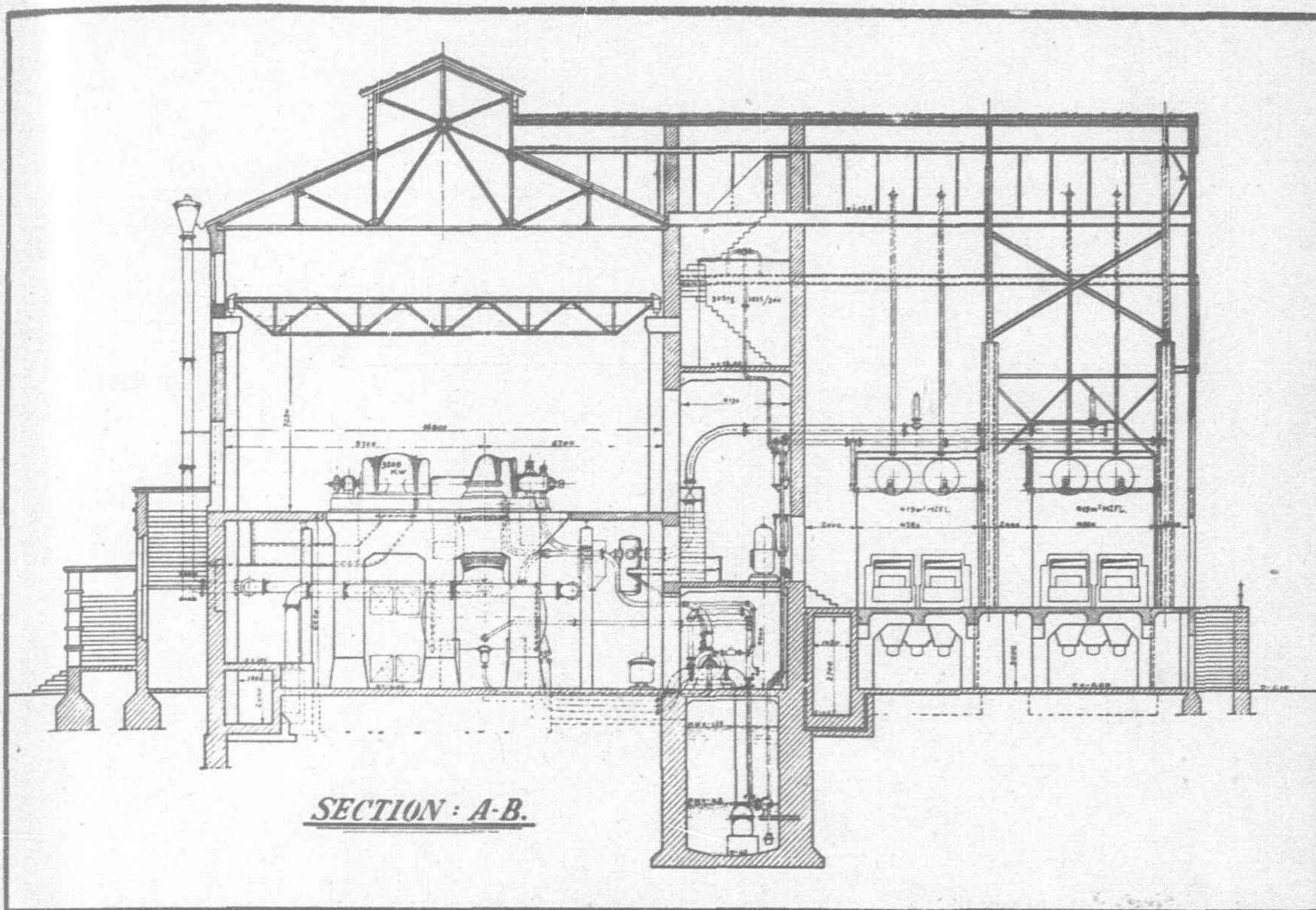


Ground Plan of Powerhouse at Tsenghua Transformer Room on left and Stack on upper right corner are not shown

a reserve-flow oil cooler. Every turbine also is provided with an auxiliary oil pump, which takes over the lubrication of the bearing on shutting down. These auxiliary oil pumps are automatically operated.

The regulation of the steam supply is effected in the usual manner by means of a throttle governor. This kind of governing is generally the most advantageous for pure impulse turbines. The governor mechanism operates on the principle of the oil-pressure governor its characteristic feature being a throttle valve inserted in the main steam inlet, and carrying an oil-pressure piston on its extended shaft. This piston is controlled by means of pressure-oil through a control valve which is again directly influenced by the governor. Hunting is absolutely impossible with this method of governing.

Further advantages of this method of governing lie in its independance of the oil-pressure. This is due to the fact that in the cylinder of the servo-motor oil-pressure acts solely against



SECTION: A-B.

oil-pressure and not against spring tension. Only in the event of the oil-pressure sinking below a certain minimum is the turbine shut off automatically as a precaution against racing. Separate provision is made by hand and by means of an electric motor for varying the speed of the turbine by 5 per cent. as may be required for synchronising the generators.

A quick-closing valve as a safety device cuts off the steam to prevent the normal speed being exceeded by more than 10 to 15 per cent., either by the failure of the governor or the pressure-oil supply. The quick-closing valve is directly actuated from the turbine shaft so that in the event of the speed exceeding the prescribed limit the safety regulator on the shaft releases a ratchet, whereupon the spring closes the main valve. This valve can be closed by hand at any time in the event of impending danger. By means of an overload-valve, live steam can be admitted into a medium stage of the turbine, thus enabling it to be overloaded by 25 per cent. when running on the condenser. This overload valve is arranged to be operated by hand.

Each turbine-set rests on foundation pillars of reinforced concrete and the surface condenser is placed between these pillars. Each condenser is equipped with a pumping set, consisting of one cooling water pump, one air and one condenser pump. The cooling water pump is of the centrifugal type. The pumping set is driven by an auxiliary steam turbine fed with live steam from the boilers. The exhaust from these turbines is led to the low pressure end of the main turbines and thus fully utilized. The condenser is a cylindrical, horizontal vessel, consisting of strong boiler plates, with a tube plate at each end. The exhaust steam from the turbine is admitted into the space between the tube plates. These carry a large number of tubes, through which the cooling water flows, and which thus represent the cooling surface of the condenser. The ends of the condenser are provided with convex covers, and fitted with the connections for the inflow and outflow of the cooling water.

By means of partitions built in the water chamber and the tube plates the cooling water is compelled to pass several times from end to end of the condenser before reaching the outflow. In order to prevent as much as possible the deposit of sediment in the condenser and to secure good cooling action the water is made to flow at a speed of 1.5 to 2.5 metres per second. The steam enters the condenser through a conical connection from above and is caused to pass in the reverse direction to that of the water flowing in the tubes. The condensed water collects at the lowest part of the condenser, passing into a condensed water tank from which it flows under vacuum to the condensed water pump. The connection between the exhaust steam outlet of the turbine and the steam inlet of the condenser is made by means of a water-gland

in order to equalize differences in expansion caused by the differing temperatures.

The condenser covers are provided with several large openings, giving access to the greater part of the tubes. Special lifting tackle is also supplied for removing the covers. The cooling tubes are of seamless drawn brass, an alloy suited to the purpose being employed. In the condenser the tubes are supported in the middle by a partition for the prevention of vibration and sagging which might otherwise lead to their early destruction. The tubes are of such a diameter as to secure a efficient exchange of heat and to enable easy clearing. They are secured in the tube-plates by screwed glands with stuffing boxes, this rendering an efficient packing and enabling the easy removal of the tubes, if necessary. A collar prevents their creeping in the direction of the water flow. The method of fitting the tubes in the tube-

plates commonly used in boiler manufacture is not adopted here, as it prevents the tubes expanding and sooner or later leads to breakage.

The cooling water pump is amply dimensioned, not only to overcome the heat between water intake and outlet, but to cover the resistances inside the condenser (tubes, etc.). The inlet and outlet is so arranged that the water flows back to the pump on its own head, so that the pump has only the resistances in the pipes to overcome. Consequent on the low pressure in the condenser, the quantity of air to be dealt with by the air pump is considerable. For this reason and in order to ensure the rapid creation of a vacuum on starting-up only such air pumps can be used, which combine high delivery with absolutely reliability. Years of experience have shown that these conditions are fulfilled by water jet nozzle air-pumps. They are distinguished by simplicity of construction. The necessary water is supplied by a special high-pressure pump coupled with the cooling water pump.

The condenser water pump is also a centrifugal pump. The condensed water, with a mean temperature of 30° C., being under the vacuum of the condenser must therefore be made to flow into the pump. The vacuum obtainable is 93.3 per cent. The pump is designed for a head of 25 metres, corresponding to the local situation and is generally speaking so arranged as to deliver the condensed water directly into the boiler-feed water tank. The pumping sets are so placed as to be easily accessible and to give short lengths of piping to the condenser. On the other hand the cooling water pumps are in the immediate neighborhood of the suction intake.

The cleaning of the condenser is of great importance. Even a comparatively thin deposit of sediment or mud greatly diminishes its efficiency and particular attention has been paid to the question of easy and efficient cleaning. Much cleaning is saved by providing sieves in the intake. Aside from these sieves a special method of cleaning the condensers has been adopted. It must be borne in mind that the oftener the cleaning is performed, the easier and more effective the process is, a thin deposit of dirt being much more quickly and thoroughly removed than a thick hard crust. The system which best meets the conditions is the so called "Hüls-meyer" patented cleaning system, in which the water is compelled by suitable deflectors to take its way through certain groups of tubes only, the velocity of flow being thereby naturally greatly increased, and the deposit of dirt, etc., effectively swirled out. The process may be daily or several times a week and by giving a few minutes to each group of tubes the condenser will for practical purposes remain clean. As before mentioned the condenser pump is driven by a steam turbine and the cleaning effect can be considerably heightened by raising its speed and thus increase the water pressure.

The Turbo-Generators

Coupled to the turbines are two turbo-generators. They are of the usual Siemens-Schuckert type built for the following conditions:—

Output	..	..	..	3200 k.w. at.
Voltage	..	..	..	6600 volts
Speed	..	..	..	3000 r.p.m.
Frequency	..	..	..	50 cycles p. sec.
Efficiency at full load and cos. = 1				= 0.96

They conform in every respect to the German regulations, which are stipulated for all electrical machinery.

It is only intended here to refer shortly to a few points which have particular bearing on the character of the generators as turbo-generators.

The stator consists of a rigid cast-iron shell, which carries the active iron form of laminated plates held together by side plates and bolts. The stator windings are carried in semi-open slots in the laminated iron, which in their lower parts form ventilation ducts. Generally speaking the stator is provided with ample axial air ducts, which carry away the heat generated in the active iron by means of the cooling air flowing through them. The stator winding is carried out as a bar winding, all measures being taken to ensure good insulation and protection against mechanical stresses.

The stator is closed on either side by endshields provided with ample openings. These facilitate inspection and at the same time prevent accidental contact with rotating or live parts.

Particular care is taken in the construction of the rotating part of the machine, the rotor above all, with regard to the exceptionally high peripheral speeds and the centrifugal stresses caused thereby.

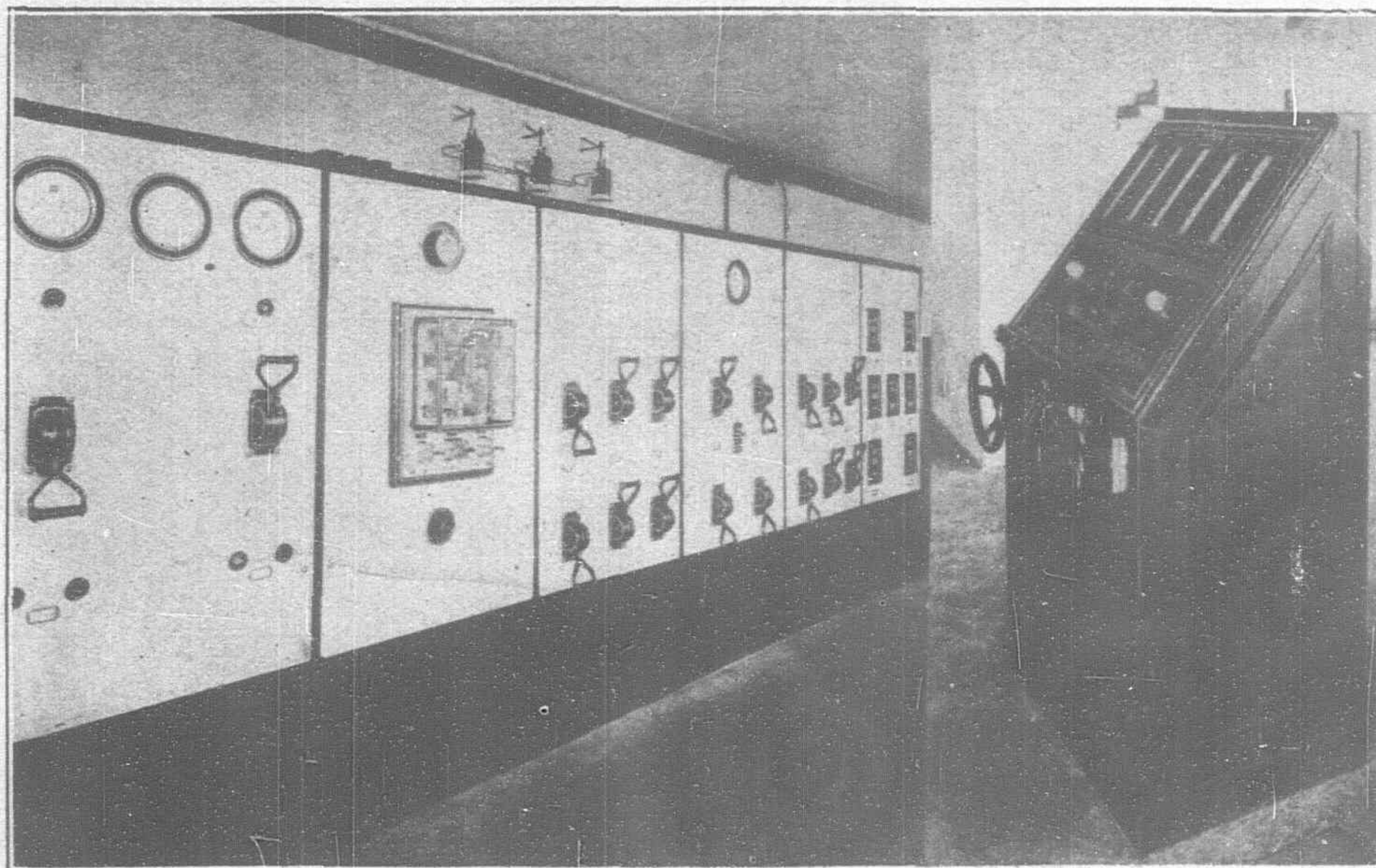
The rotor core is forged in one piece with the shaft and is wholly cylindrical. The ends of the coils are secured against centrifugal stresses by metal caps to which fans are connected at each end for the creation and distribution of the necessary cooling air.

The shaft with rotor is balanced in the same manner as the turbine shaft, so that smooth running is assured. The shaft is calculated on the same principles as that of the turbine in regard to the critical speed, so that in combination with the rigid coupling between turbine and generator the rotating parts of the set comprise a unit of mechanically simple and sound construction ensuring the highest imaginable degree of reliability in service.

The rotor and stator are erected in such a manner that the centres of their magnetic fields exactly coincide, thus obviating any axial pull on the turbine thrust-bearing. Provision is at the same time made for heat expansion.

The rotor runs in ample bearings which in design and outward appearance correspond to the turbine bearings. They are bolted to the bedplates and can be adjusted by liners to the exact level. Lubrication is effected by the same apparatus as for the turbine. Due precaution is taken to prevent oil leakage and waste.

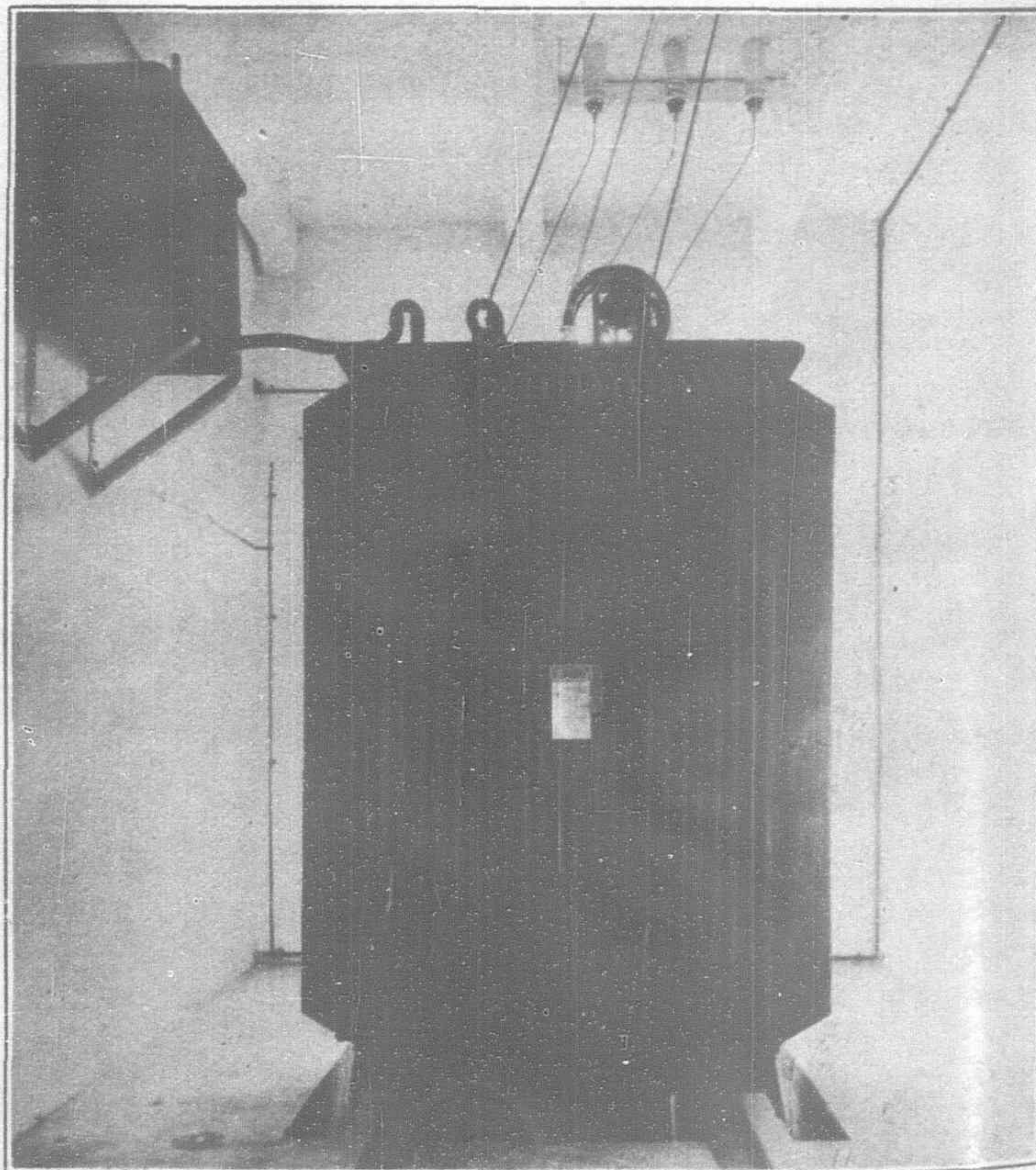
The cooling air is drawn in at both sides of the frames through a special air duct, passing a filter on its way. The hot



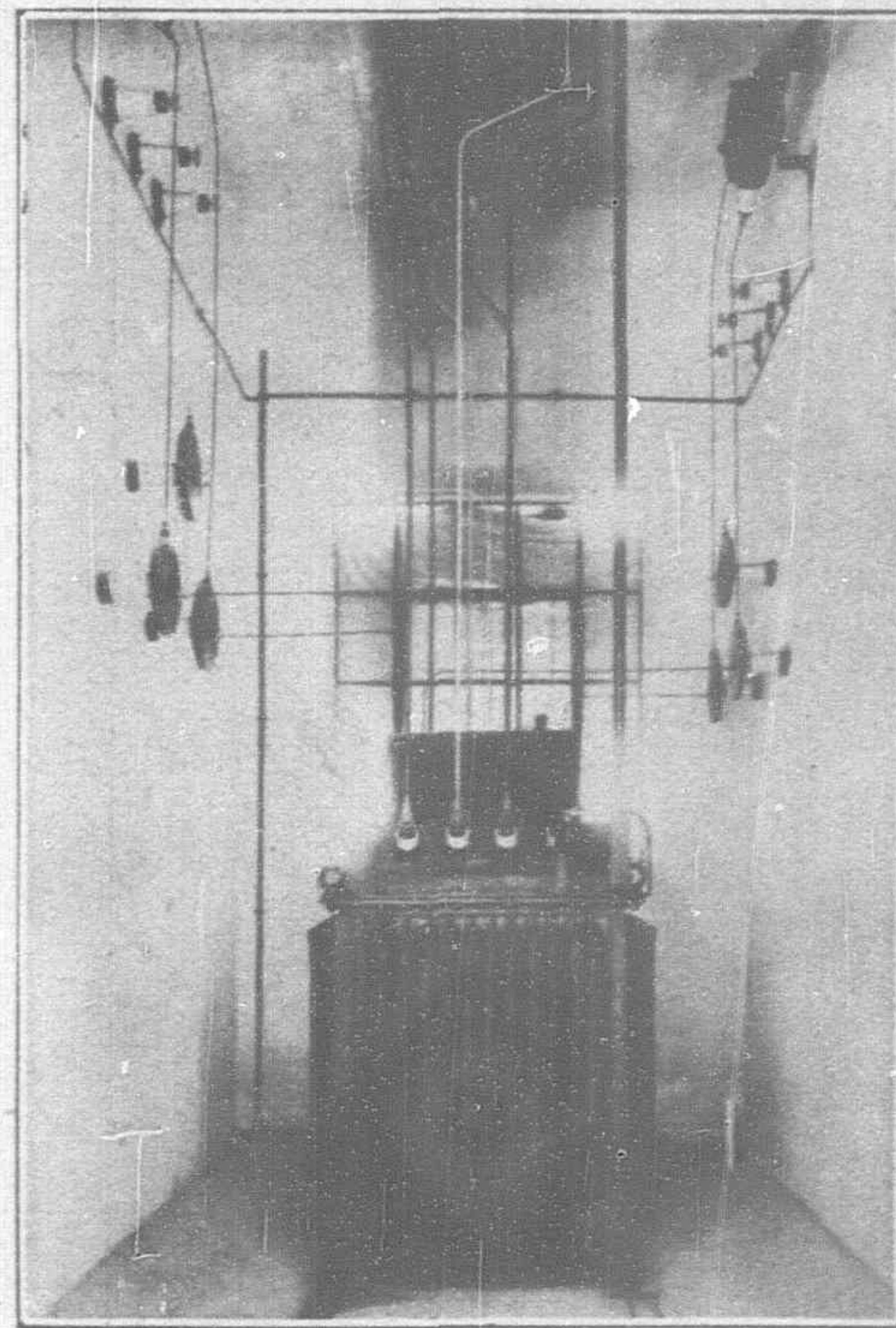
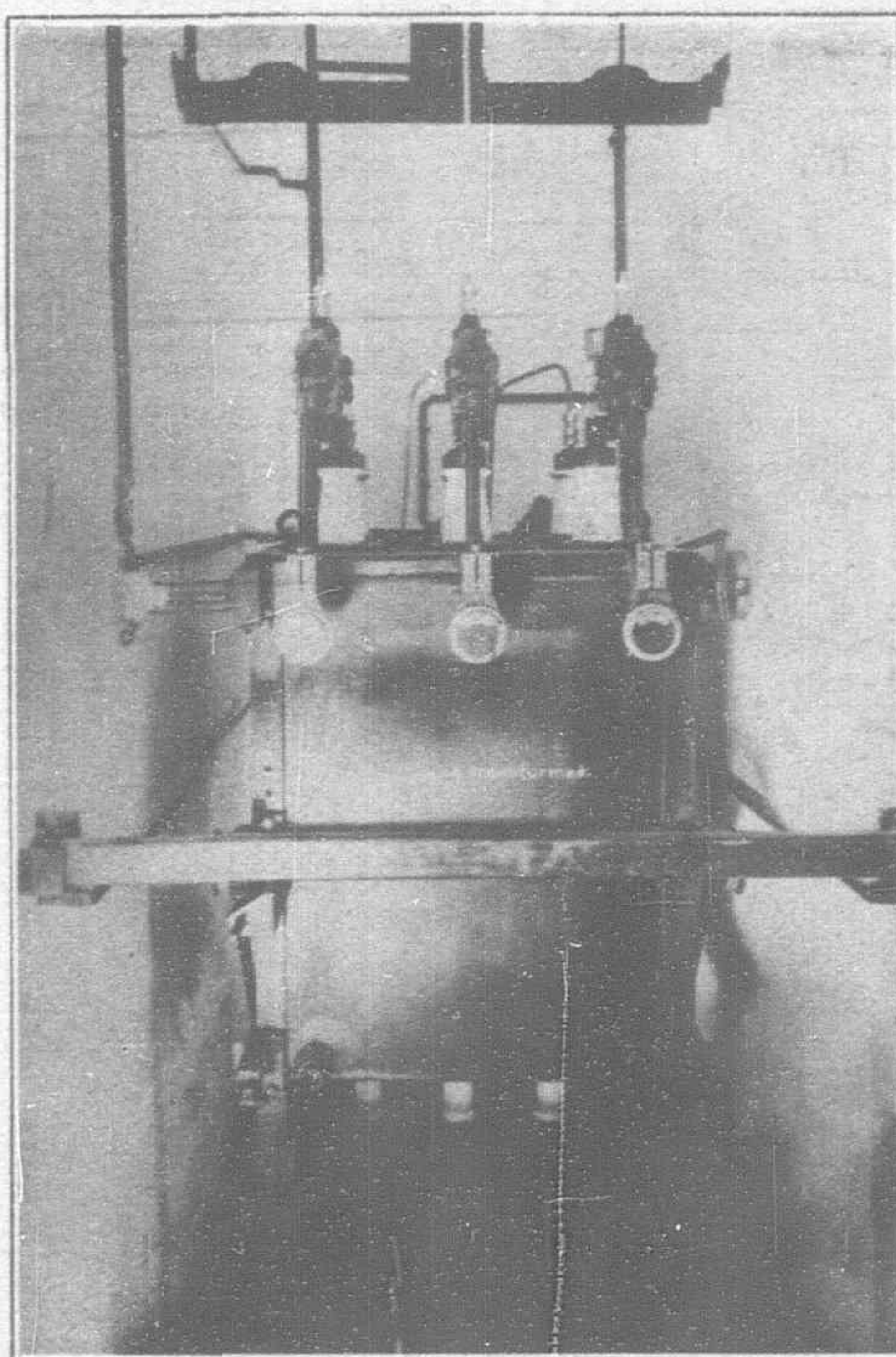
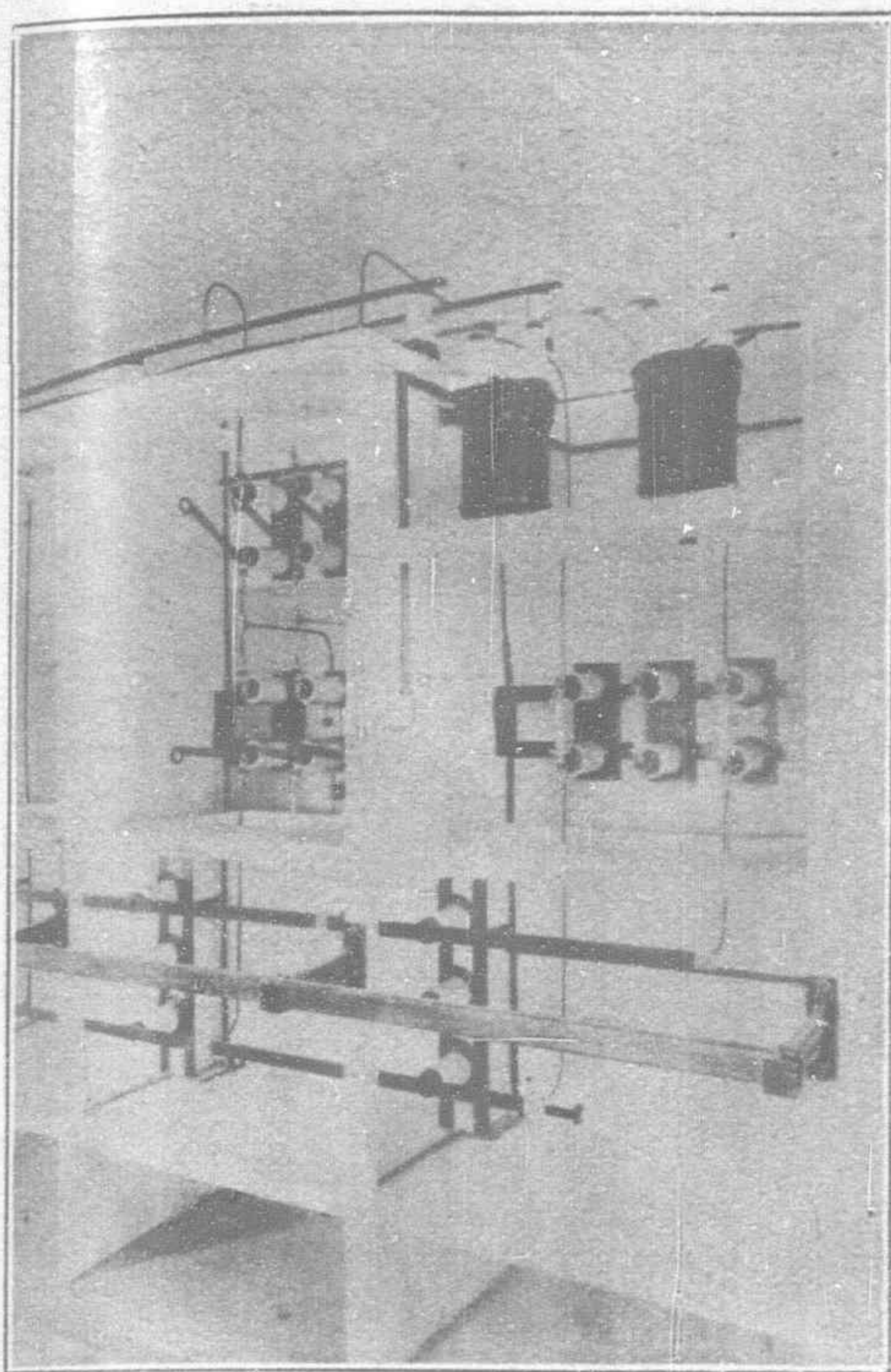
Switch Gallery with Switch Board and Switch Desk (for one Generator) on right



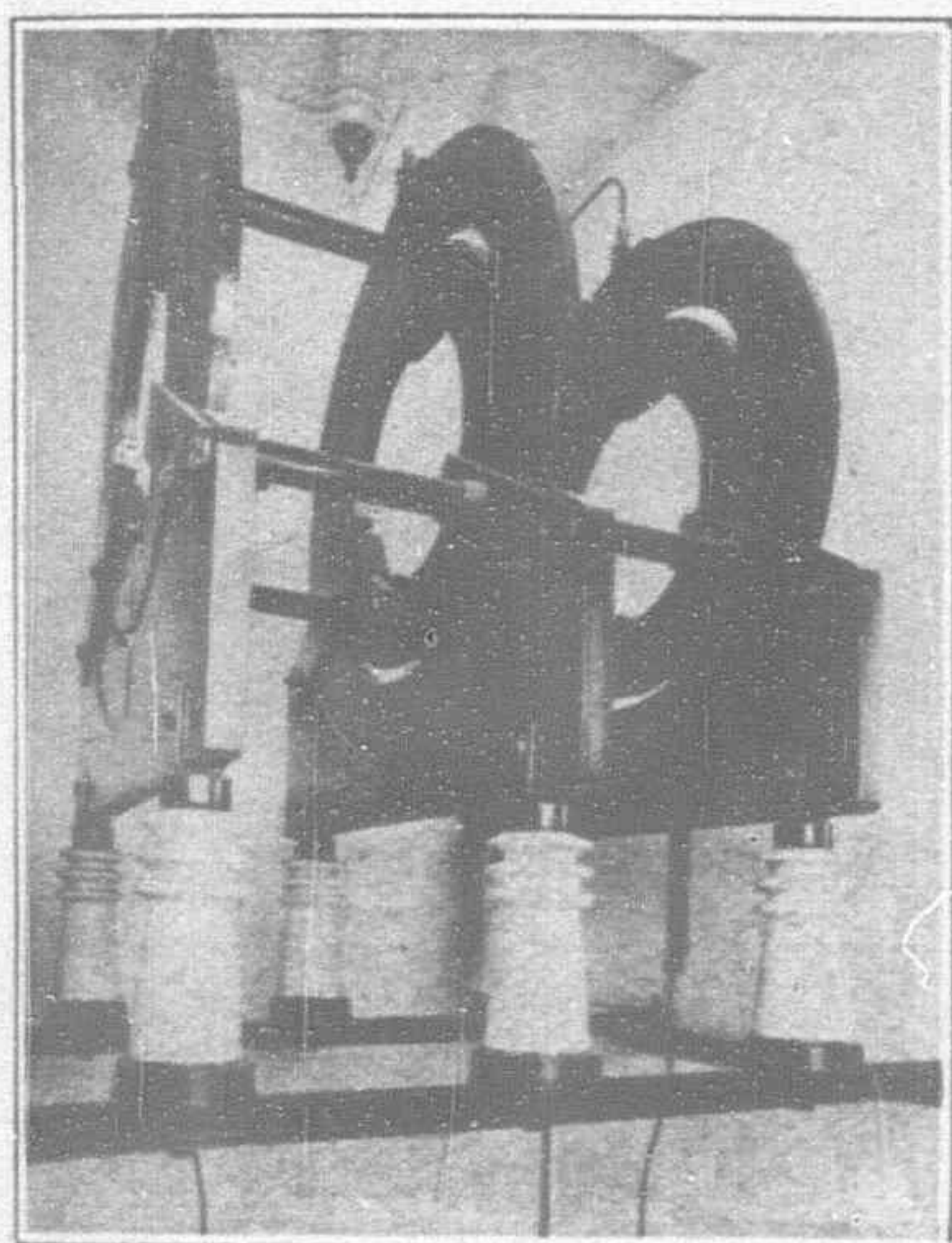
Busbar Cells for 6,600 and 33,000 Volts



2,000 k.v.a. Main Transformer—Oil Expansion Chamber on Upper Left



Above to left is the 6,600 Volt Meter Cell—In the centre is one of the Oil Switches for the 2,000 k.v.a. Transformer and on the right is shown the Type of Station Transformer. Below to left are the Choking Coils and on the right is one of the "Hornbreak" Type Lightning Arresters that Protect the 33,000 Volt Busbars



air is discharged through an opening in the centre of the lower part of the stator and is led back through a duct into the open air.

The generators are excited by directly coupled dynamos at 110 volts. The excitation energy for each generator is 23 k.w.

The voltage regulation is effected by a rheostat in the field of the exciter. For keeping constant voltage a

Siemens automatic regulator of the high-speed type is used.

Before leaving the test bed the generators were subjected to a short-circuit test under full excitation. The generators have fulfilled this test without the slightest difficulty.

The Main Transformers

For stepping-up the voltage of the generators, from 6,600 to 33,000 volts two main transformers of the shell type for 2,000 k.v.a. output each are at present installed. The transformers are built for self-cooling. They are so designed and dimensioned, that the highest temperature rise in the windings is about 70° C. as prescribed by the regulations of society of German electrical engineers. The temperature rise in the warmest strata of the oil is about 55° C.

The individual packets of transformer iron are held together by powerful clamps, so constructed that on removal of the cover, the transformer can be easily braced up. Special provision is made in the design for channels in which the oil can circulate so as to ensure adequate cooling of all parts.

The coils are composed of flat formed wound turns arranged in a single layer one above the other. The first section of the winding is specially insulated as a protection against the inrush of dangerously high voltages. The windings are amply subdivided to prevent magnet leakage.

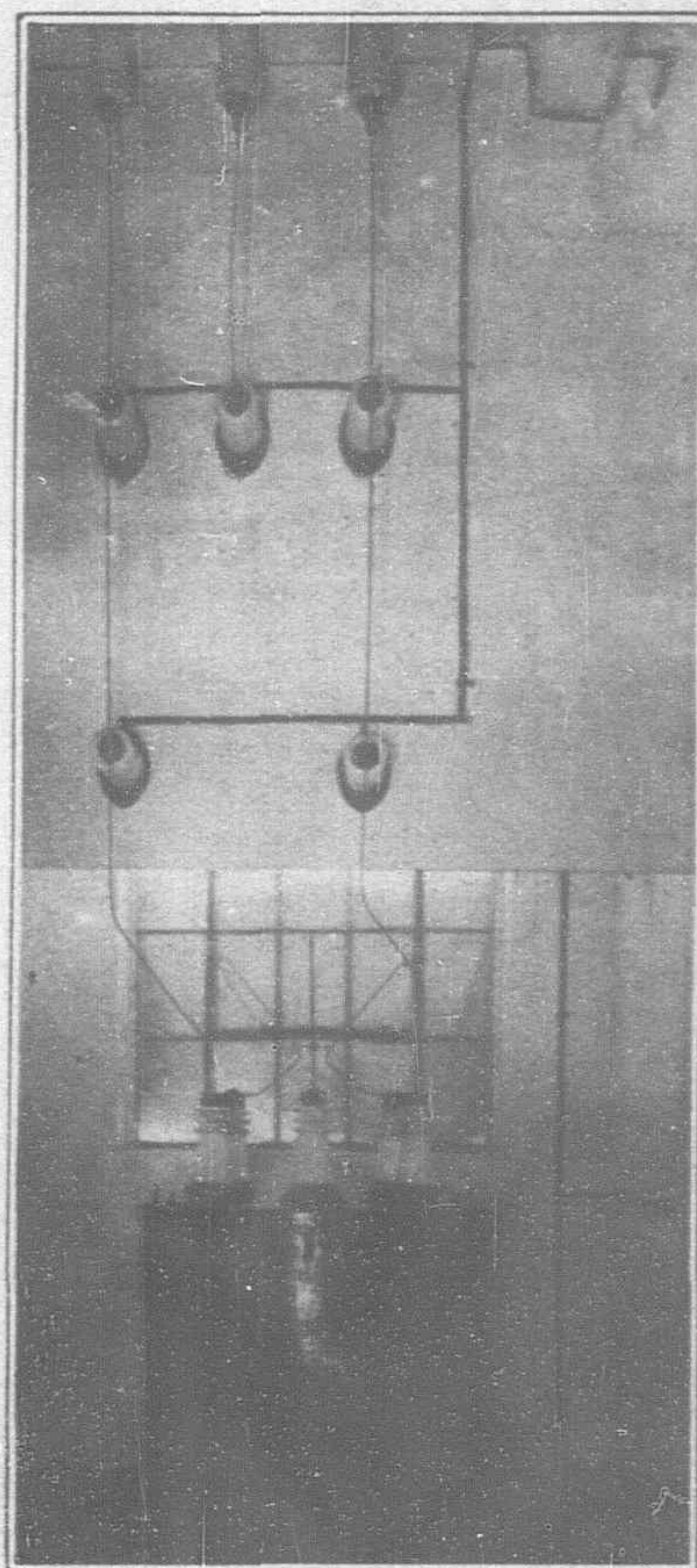
The individual groups of coils are separated from each other by layers of presspan with ample overlap and by oil ducts. The number of these latter is so chosen, that each coil is brought into direct contact with the oil flow. The heat generated in each is

thus imparted straight to the oil without having to pass through several layers of insulation. In this way the temperature throughout the transformer nowhere exceeds the permissible limit. As a precaution of safety against short circuit the windings are stayed in all directions amongst themselves and against the core.

The transformer stands in a portable wrought-iron case, the sides of which are wholly corrugated. As will be seen from the illustration, the corrugation are deep and therefore efficient as regards cooling.

It is essential for the reliability of oil-cooled transformers that the oil remains permanently in good condition and free from water. Experiments have demonstrated the fact that hot oil, if in immediate contact with air, absorbs oxygen from the atmosphere and undergoes a chemical change. To protect the hot transformer oil from contact with the air and thereby from decomposition, each transformer is provided with the well-known Siemens-Schuckert "oil-expansion chamber". It consists of a vessel, which mounted separately above the transformer tank and connected by a U-shaped pipe with the interior of the same. After the tank has been filled with oil, the pipe is screwed to the lid and the vessel likewise partly filled. The hot oil in the transformer is thereby separated from contact with the air by the cool oil in the vessel.

The oil-expansion-chamber prevents at the same time the formation of condense water in the transformer tank. Transformers without oil-expansion-chambers are subject to the further disadvantage that following on the contraction of the oil, which takes place every time the transformer cools down, air is drawn



into the tank, thus imparting moisture to the oil. In order to prevent any condense water which may be formed in the expansion chamber from reaching the interior of the tank, the U-shaped connection pipe is fitted at a certain height above the bottom of the vessel. A drain cock is provided at the lowest point of the expansion chamber which permits to test from time to time the oil of the lower strata and to remove any water which here may have collected.

The oil-expansion-chambers are equipped with a safety valve which comes into operation when the transformer contains too much oil, or when some internal damage causing the development of gas should occur.

Both the high- and the low-tension terminals are of porcelain and of a special design. The live parts of the terminals are under oil, so that the formation of ozone, which would greatly accelerate the deterioration of the oil is prevented.

The Transformer for the Power Station Supply

For feeding the various auxiliary motors in the power station the voltage of 6,600 volts as supplied by the generators is not suitable. Therefore two transformers were installed for the station supply. Each transformer has an output of 150 k.v.a. and is self cooling. The ratio is 6,600/380/220 volts on no load.

The Switchgear

The connection diagram of the power station shown above, is particularly simple. The turbo-generators are connected to double busbars for 6,600 volt and from these to the two main transformers, which similarly are connected on the H. T. side to a further system of double busbars for 33,000 volts, from which the two 33,000 volts transmission lines emanate.

From the 6,600 volt bus two lines lead out, of which one goes to the Lee-Ming-Spinning Co. and one to the transformer station in Tsishuyen.

Each of the system of busbars, the 6,600 volt as well as the 33,000 volt system, can be coupled by means of special oil switches.

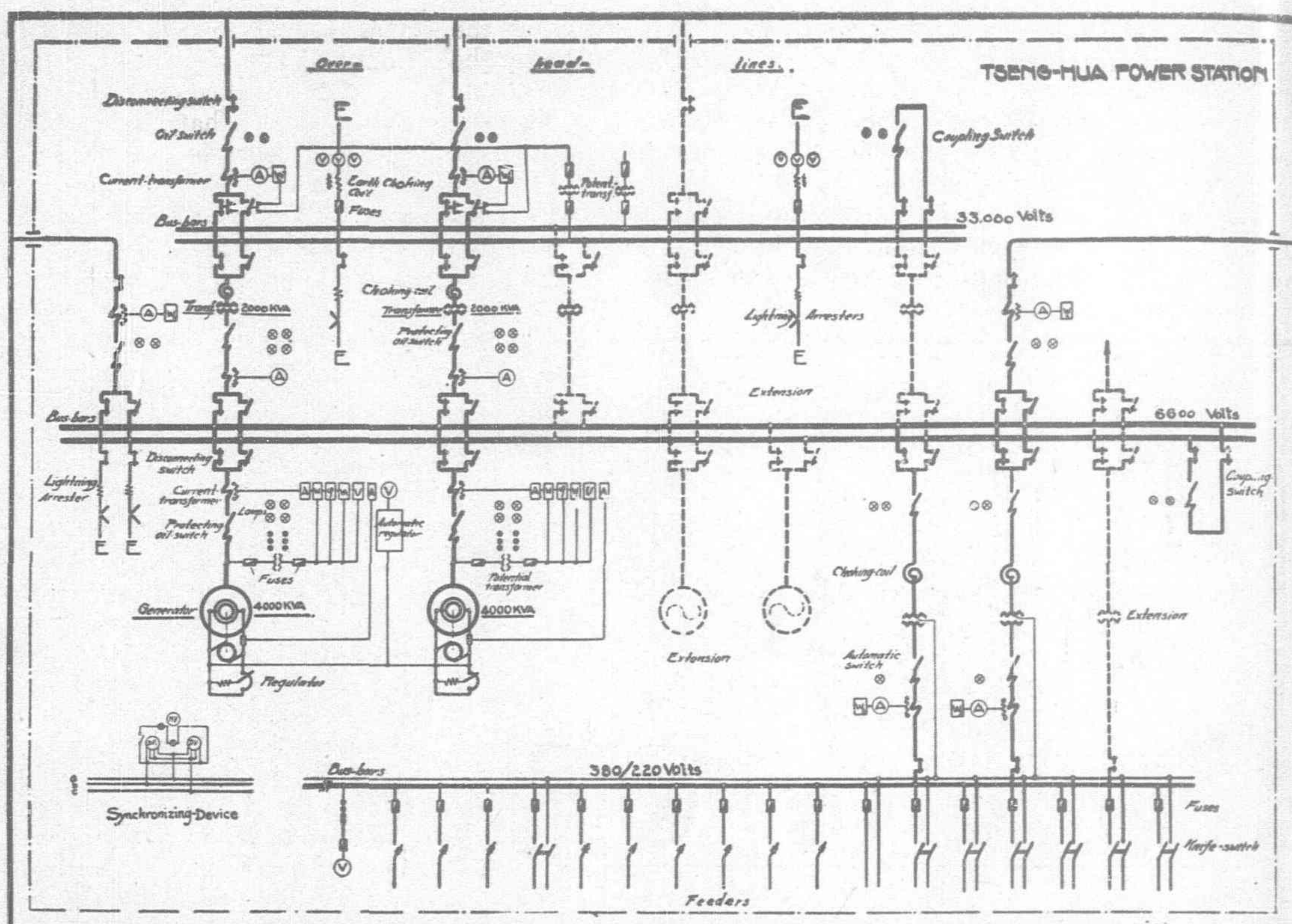


Diagram of Connections in the Main Power Station

It is thus possible to work either on each busbar system separately, or on both together, on the L. T. as well as the H. T. side, and the transference from one system to the other can be effected with ease.

The instruments and switchgear side are of the usual type and do not call for special mention. Only a short description of the installation may be of interest.

As a protection against dangerously high voltage the main transformers are provided on the H. T. side with choking coils in each phase.

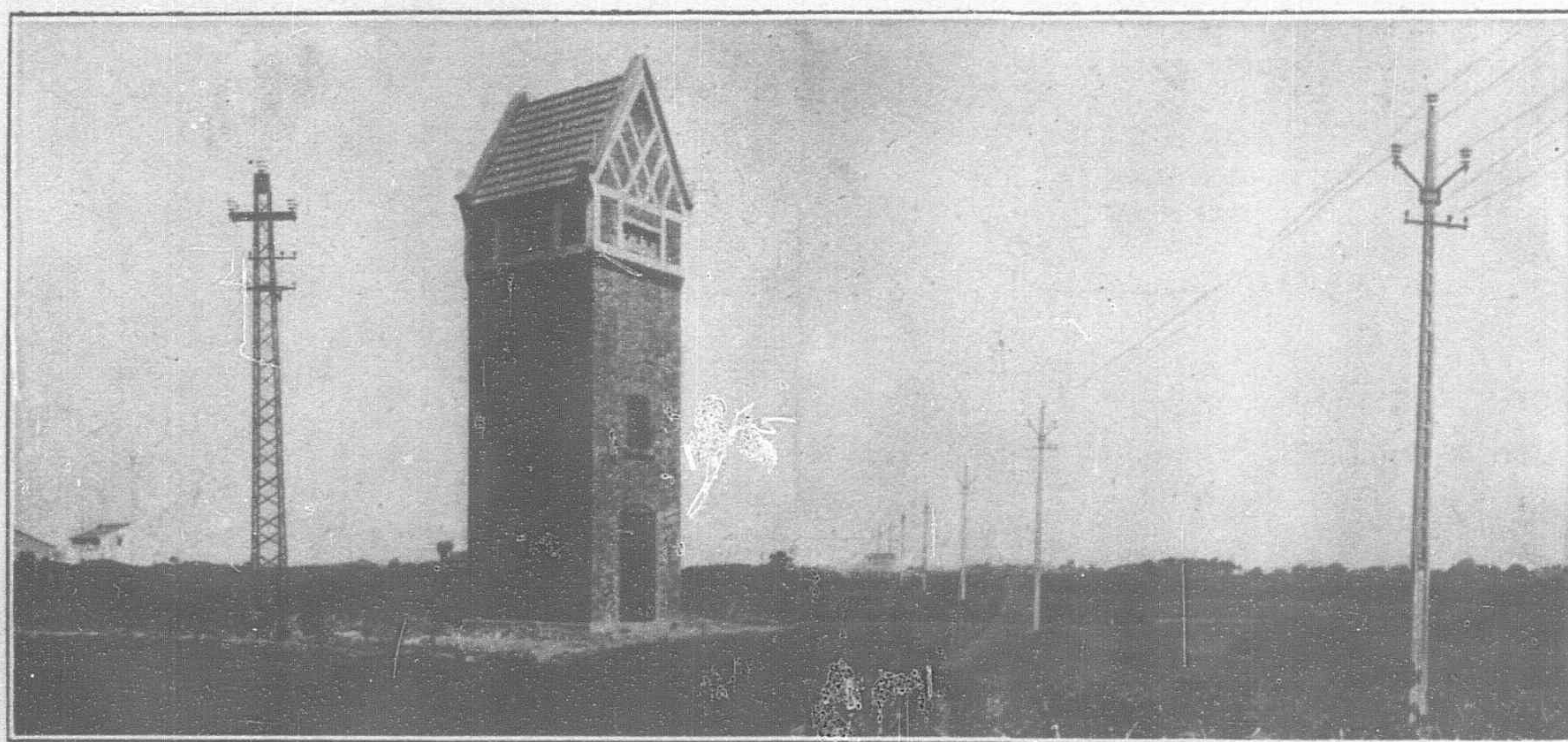
Each busbar system is equipped with a high voltage protection device consisting of horn-break arresters connected in star delta series with oil resistance in each phase.

The danger of static discharges have been avoided by the choice of earthing coils, which are connected to the 33,000 volt-bus. The earthing coils are made with a secondary winding to enable the connection of voltmeters for measuring the voltage between phases and earth. All of the above mentioned apparatus are connected to the busbars by disconnecting switches.

Each of the outgoing transmission lines can be connected by means of disconnecting switches with each of the two busbar systems. For switching on and out under load each line is provided with a oil switch with protective resistance and maximum relays in each phase. In order to protect the switches from reverse current from the line, when in the "off" position, another set of disconnecting switches is inserted.

The general arrangement of the switchgear and instruments is as follows: The switch gallery contains of a switch desk and a switch board with 9 panels. The desk carries the controlling apparatus for the generators, regulator gear, instruments and signal lamps.

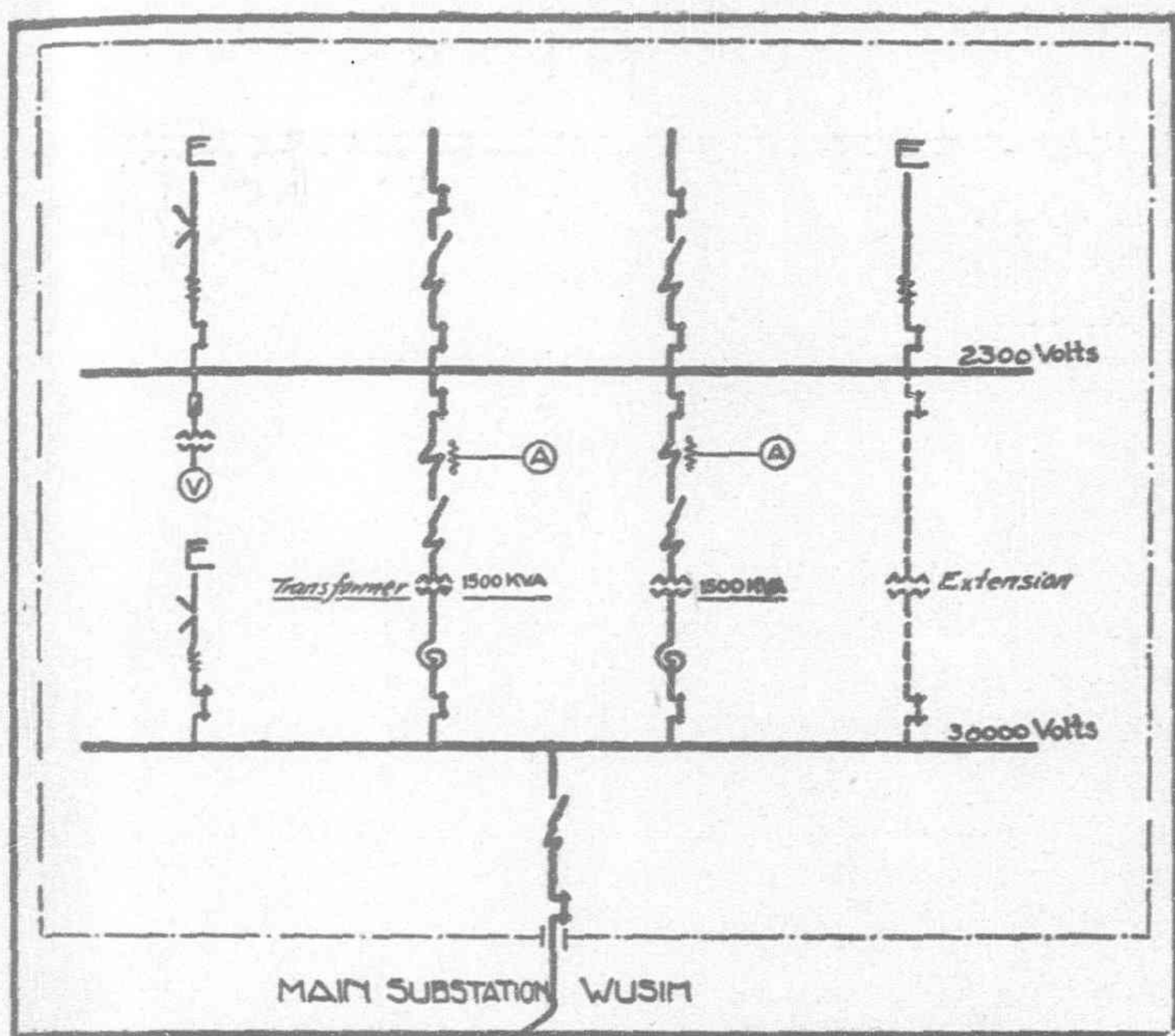
When the ultimate extension is installed, it will consist of four similar sections for the apparatus and instruments



Type of Iron Pole and Transformer Station at Tsishuyen—On Right is the 33,000 and 6,600 Volt Transmission Line

for the turbo-generators and one centre desk, which contains the synchronising instruments. Behind the switch desks is arranged the nine panel switch board, for the distribution, which contains all the other apparatus for the 6,600 and 33,000 volt plant. The high tension apparatus for 6,600 and 33,000 volts are distributed over two storeys of the switchgear house.

The ground floor takes the cells for the main transformers and the 33,000 volt high-tension protection device. The two transformers for station supply are also installed here.



On the first floor are the cells with the oil switches, the 6,600 volt high-tension protective device and the metering cells with the necessary current and voltage transformers for the generator instruments. These cells as well as the other cells for 6,600 and 33,000 volts are built up of concrete.

On the second floor, i.e., on a level with the switch gallery are the busbar cells for 6,600 and 33,000 volts together with the meter cells for the watt-hourmeters, arranged in two opposite rows. Underneath the switchboard floor are the magnet regulators for the turbo-generators.

The oil switches are built as single tank switches. They are fitted with relays in each phase fed by the high tension current and connected by insulating rods to the retarding mechanism, by means of which the current and the time can be adjusted. This can be effected when the switches are in circuit. The switches are operated by hand. Every oil switch has a special signal lamp controlled by auxiliary contacts on the respective switches, so that the exact state of the connections can be recognized by the attendants at any minute.

The connections with the oil switch cells are carried through wall bushes, to avoid openings in the ceilings which would favored the spreading of a fire.

Special attention was paid to the earthing of all metal not under tension. For this purpose conductors of 6 by 20 m.m. strip-iron run through all cells and are connected to the iron frame work of the apparatus. These main connections are linked up to two separate galvanised iron plates, which are embedded at a depth of about 3 metres in the earth.

The Main-Substations at Wusih and Changchow

The main-substations at Wusih and Changchow are both built to the same design; a description of one will therefore apply also to the other. The only difference which exists, is in the size of the transformers. In the Wusih substation two transformers are provided each for an output of 1,500 k.v.a. while in the Changchow substation each of both transformers has an output of 1,000 k.v.a. Corresponding to the incoming voltage their ratio is 30,000/2,300 volts. They are connected in star/star. The connections in these substations are practically the same as those of the central-station and is again comparatively simple. The incoming supply at 30,000 volts goes to busbars and from

here through the two main transformers to the 2,300 volts-busbars. Connected to these are the chief consumers.

The arrangement of the apparatus is also the same as at Tsishuyen, so that a repetition is unnecessary.

The cells for the oil switches for the transformers and outgoing feeders for the transformer themselves are placed on the ground-floor while the top floor contains the 30,000 and 2,300 volts busbars with the disconnecting switches.

All the cells are surround by wide passages, so that the whole plant can be inspected without any difficulty or danger. All accessible parts which might be accidentally touched, are earthed.

The Overhead Transmission Lines

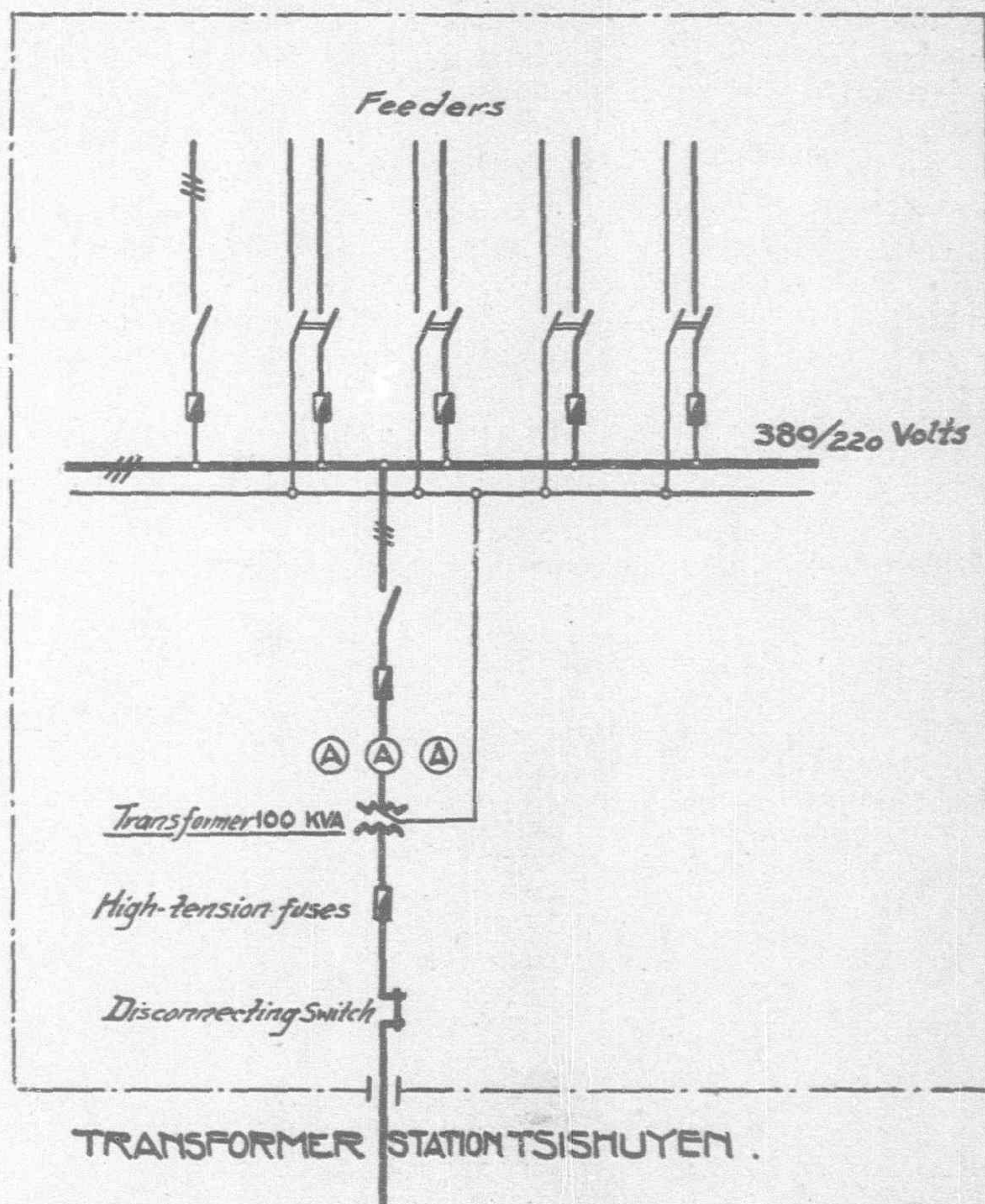
At present two lines for 33,000 volts lead out from the central station, of which one goes to Wusih and one to Changchow; two other 6,600 volts lines supplies the substation of Lee Ming Spinning Co., of the village Tsishuyen.

The material used for the conductors is stranded wire 3 by 25 sq. mm. and is pure hard-drawn, electrolytic copper. Special attention has been paid to joining the ends of the wires. Instead of the usual twisted joints the ends are connected by the approved Siemens grooved joints. By means of this kind of joining the tensile strength of the joint is 90 per cent. higher than the strength of the conductor itself.

The conductors are carried on reinforced concrete poles, mostly 10.4m. high, usually placed about 80 to 90 meters apart. Wooden poles are only used in the 2,300 volt lines between Changchow substation and the Changchow Cotton Mill.

The insulators for the main lines, supplied by the Hermsdorf Porzellanfabrik, are of the well-known petticoat type, with prominently projecting sections between the top and bush surrounding the support. In this manner direct sparking between the top section and the support is prevented, because the surface leakage path, along with the current could creep, is considerably lengthened.

The insulators are fixed to the supports with hemp.



At regular interval of 2.5 to 3 Km along the line in accordance with local conditions special iron poles are erected to withstand the extra pull that might be produced in the case of a break.

Protecting network is provided at all places, where other overhead lines or telephone lines are crossed.

The Angat River Irrigation System Philippines

By Nicanor Cortes, Designing Engineer, Bureau of Public Works

THE Angat river irrigation system is the largest and is otherwise representative of the 16 projects commanding an aggregate area of 64,535 hectares and estimated to cost completed P.10,662,500 (P.1.00 peso = \$0.50 U. S. currency) which are now in operation or are under construction since the inauguration in 1918 of

the irrigation construction program of the Philippine government. This program was embarked upon with the view of insuring against droughts and increasing the production of rice, the staple food of the Filipinos. During the period from 1899 to 1918 there were imported into the Philippines, 3,601,414 metric tons of clean rice valued at P.242,585,120 which represent an average annual importation of 180,071 metric tons—3,100,000 cavanos in the Philippines—valued at P.12,129,256. It was estimated that an investment of P.20,000,000 in bond issues, in addition to appropriations from current government revenues made from 1918 to 1921 amounting to P.3,297,000, would place under irrigation a total area of 160,000 hectares, thereby increasing the annual production of rice by at least 180,000 metric tons, sufficient to meet the country's average annual shortage of the cereal. What follows is a brief sketch of the Angat river irrigation system intended to give a glimpse of what has been accomplished in this undertaking and of the conditions obtaining and problems encountered in the Philippines in carrying out irrigation construction work.

The Irrigable District

The district comprises 25,000 hectares of land, 10,000 being on the north side of the Angat river, the source of supply, and 15,000 on the south side, the centre of the whole area being 40 kilometres

north of Manila. The lands have been under cultivation for years and are among the finest agricultural lands to be found in the Philippine archipelago. The market value of these lands ranges from P.400 to P.2,000 a hectare, the average being about P.1,000. The district is one of the most thickly settled regions in the islands, the total population of the 10 towns benefitted being

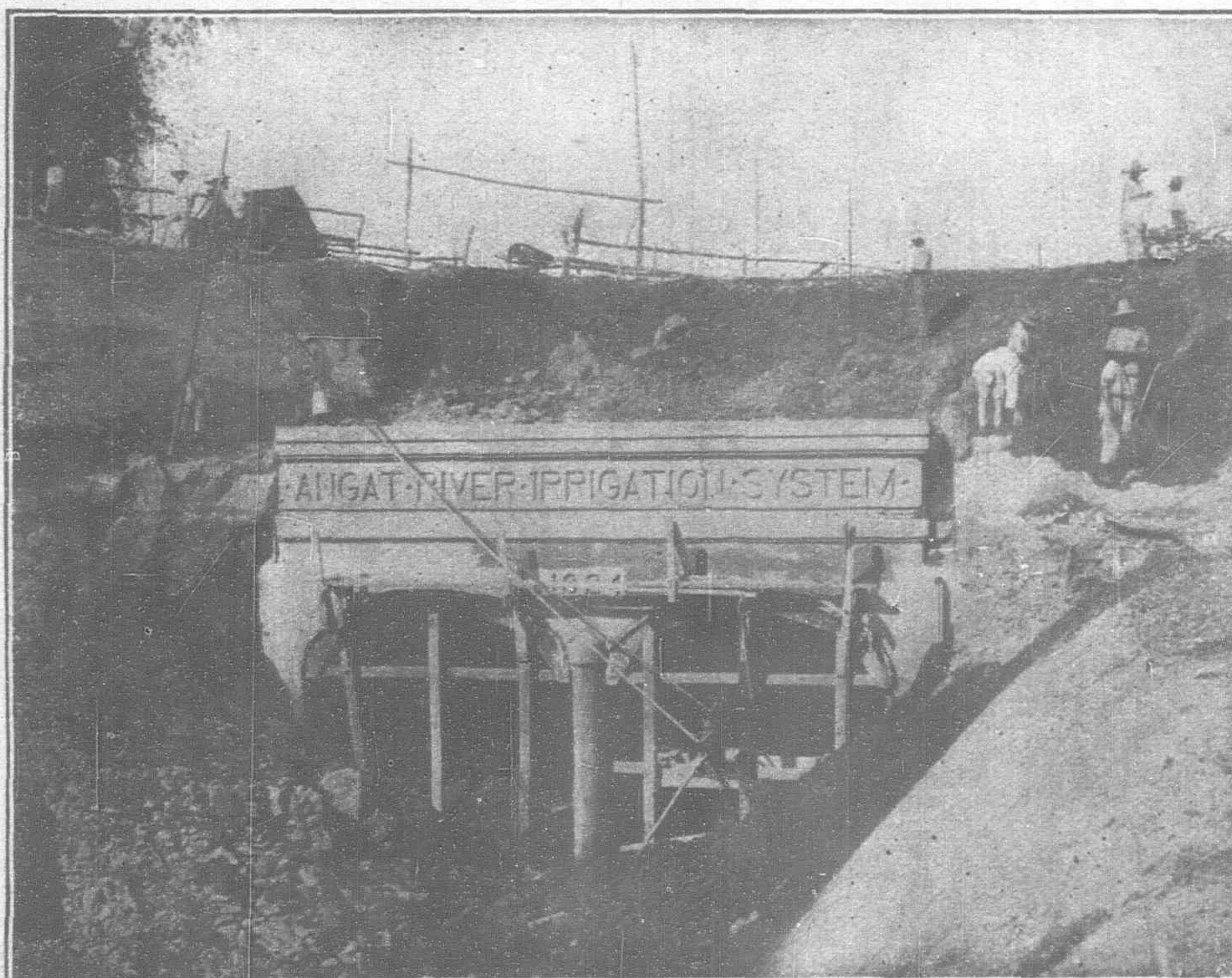
over 112,000. Practically all of the lands under the project are owned by the residents although there are many people living in the district who do not own lands and cultivate only two to four hectares. Landholdings are relatively small, generally less than 15 hectares, and there are only a few larger than 100 hectares.

Crops Grown and Need for Irrigation

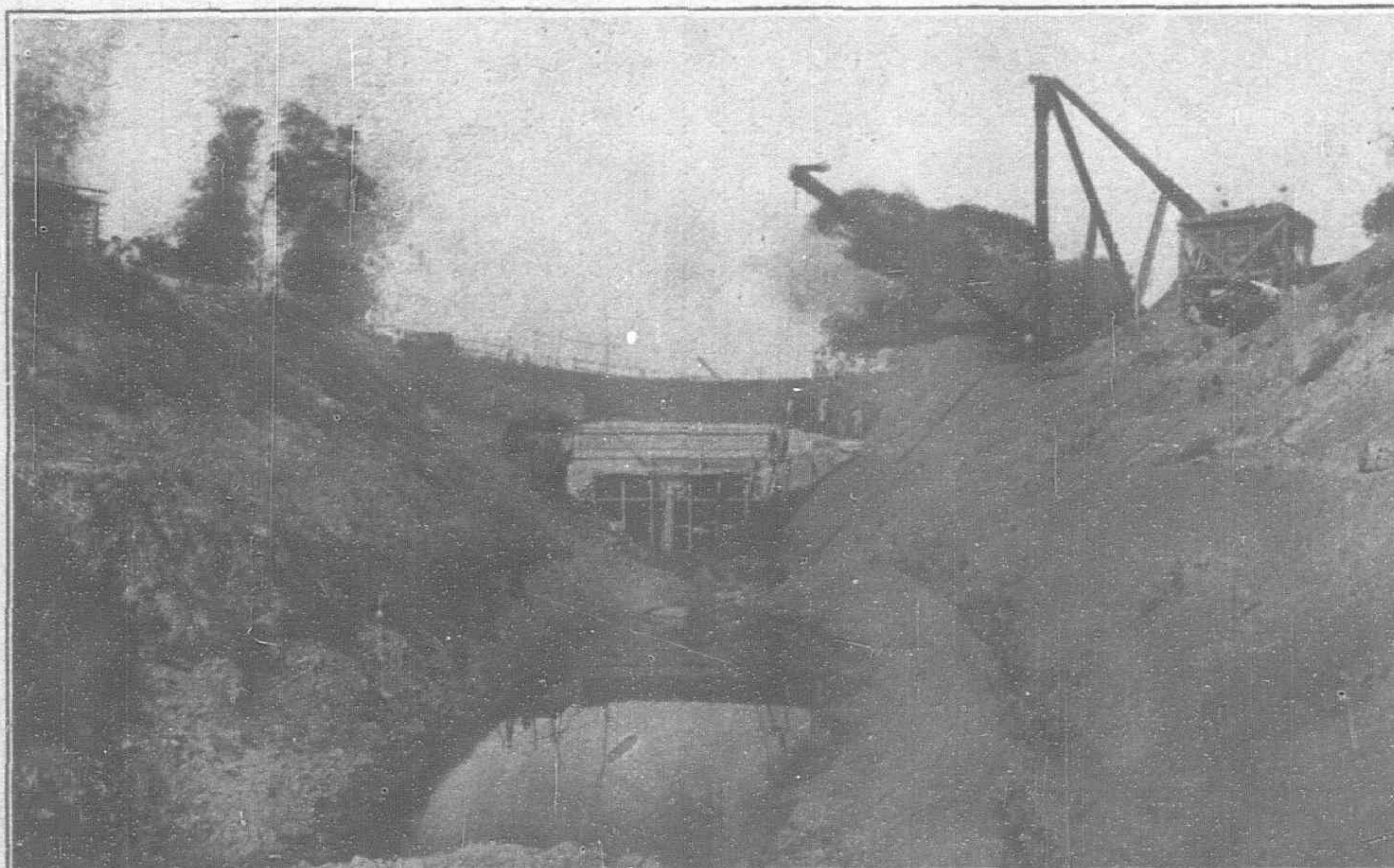
Almost the entire area under the project is devoted to growing one crop of rice a year, but it is actually producing a relatively low yield owing to the insufficiency of rainfall to satisfy the water requirements of the rice plant. On the average two crop failures have been reported out of every five planted. A small portion of the area is used for growing sugar cane, corn, tobacco, and vegetables. It is estimated that the yield of rice will be increased under irrigation 30 to 60 per cent. over the present average of 1,250 kilos of rough rice per hectare. Unhusked rice commands in the district a price which rises from P.0.06 a kilo just after harvest time to P.0.11 a kilo just before the following crop is harvested.

Transportation and Market Facilities

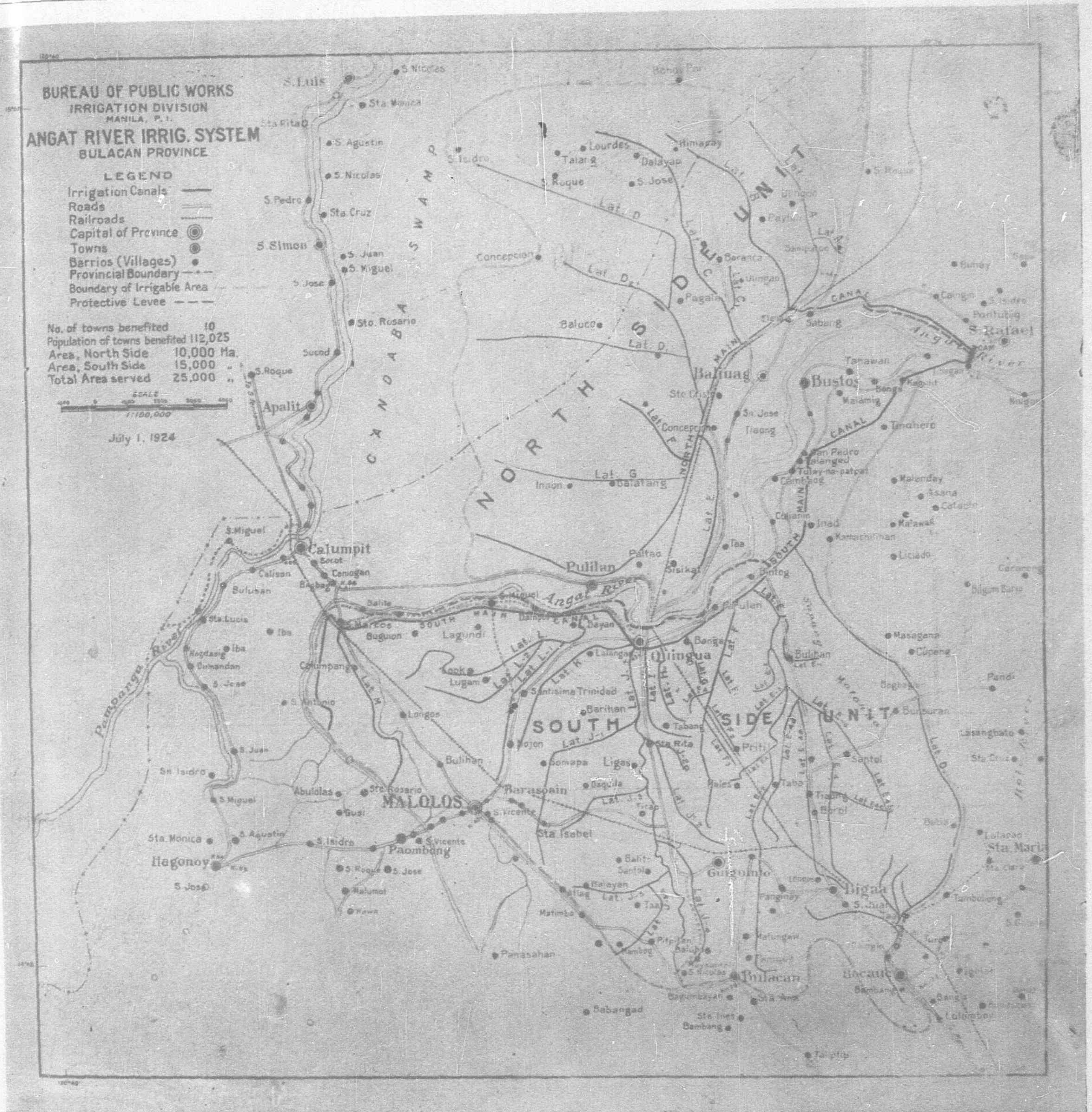
The transportation facilities of the district are among the best to be found in the country. Automobile macadamized roads, besides many inferior ones, traverse the entire tract from north to south and from east to west.



Main Canal, Tunnel in the Distance, Angat River Irrigation System.



Tunnel, South Main Canal, Angat River Irrigation System, Bulacan Province, P.I.



Numerous passenger and freight trucks are making regular runs over these roads. Railroad lines radiating from Manila cross the centre from north to south and traverse the southern and western boundaries. The project is located near great centres of population, where the anticipated increase in production will find a ready market.

Water Supply and Water Demand

A continuous record of the flow of the source of supply, kept from 1909 to date, excepting the period from 1914 to 1917, shows that there is sufficient water available to supply the anticipated demand. The diversion required is 1.5 second-liters per hectare, which rate is usually used in lands to be irrigated with soils and subsoils of heavy texture, such as prevail in this project and in most rice regions in the Philippines. This rate covers evaporation and seepage losses in the main canal and laterals and has been determined for the irrigation water to be supplied in a very dry year, which is liable to occur once in five or six years. The maximum diversion

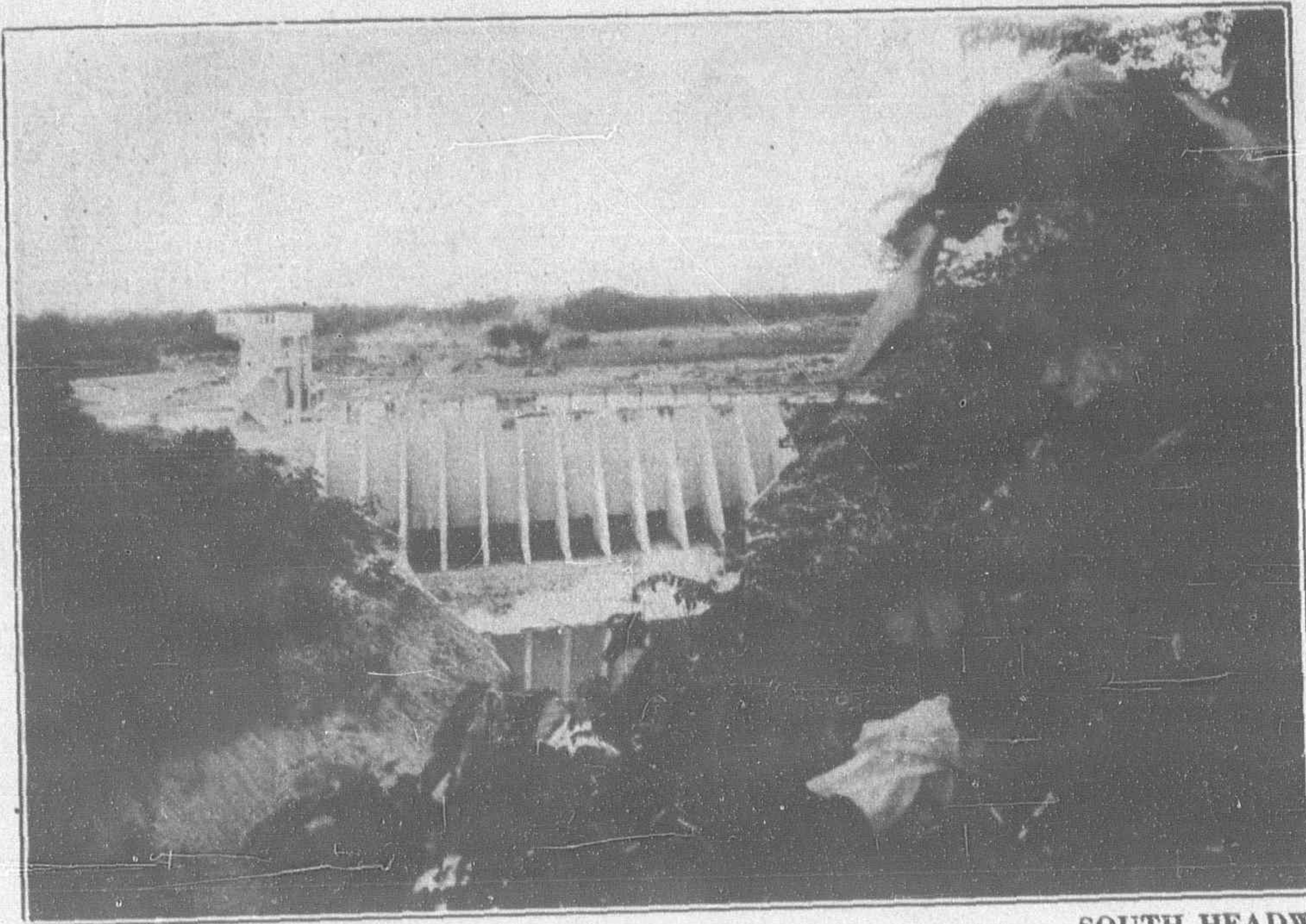
is, therefore, 15,000 second-liters for the 10,000 hectares of rice land located on the north side of the river and 22,500 second-liters for the 15,000 hectares of land on the south side. The irrigation season begins in May and June when nursery beds are prepared and ends in November and December when the crop is harvested. Transplanting is done in June and July.

Official records show that there are no water rights on the Angat River except those reserved for the proposed extension of Manila waterworks system. Water-rights in the Philippines are based on the doctrine of appropriation and are appurtenant to the lands. Their basis and measure and limit is the beneficial use. Difficulties in the apportionment of water arising from water-right controversies are not anticipated.

The Irrigation Plan

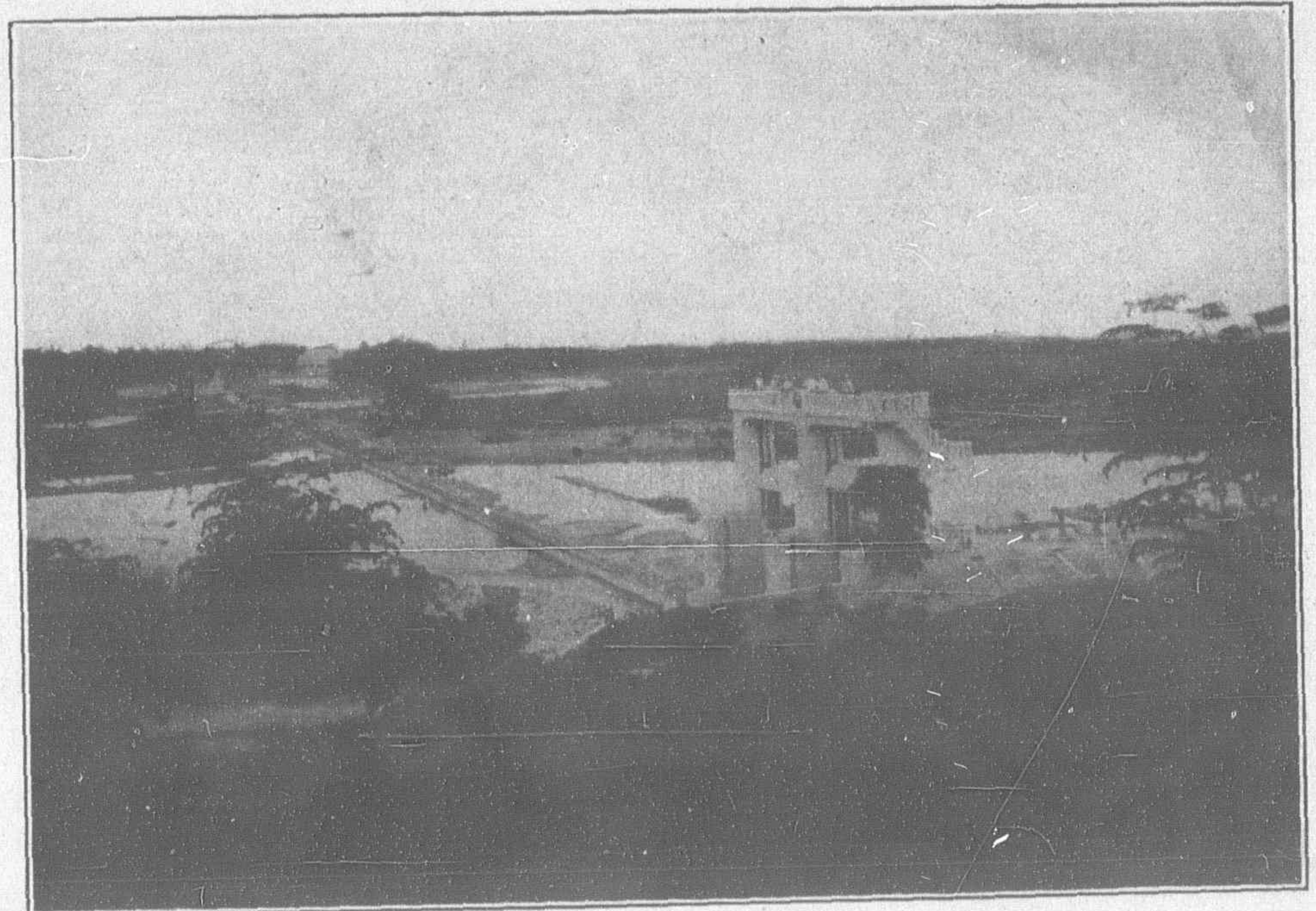
The irrigation plan of this system provides for the diversion of water from the Angat River by means of an overflow dam located near the town of San Rafael into two main canals, north and

ANGAT RIVER IRRIGATION SYSTEM, DIVERSION WORKS



Looking North Approximately along the Axis of Dam

SOUTH HEADWORKS IN FOREGROUND

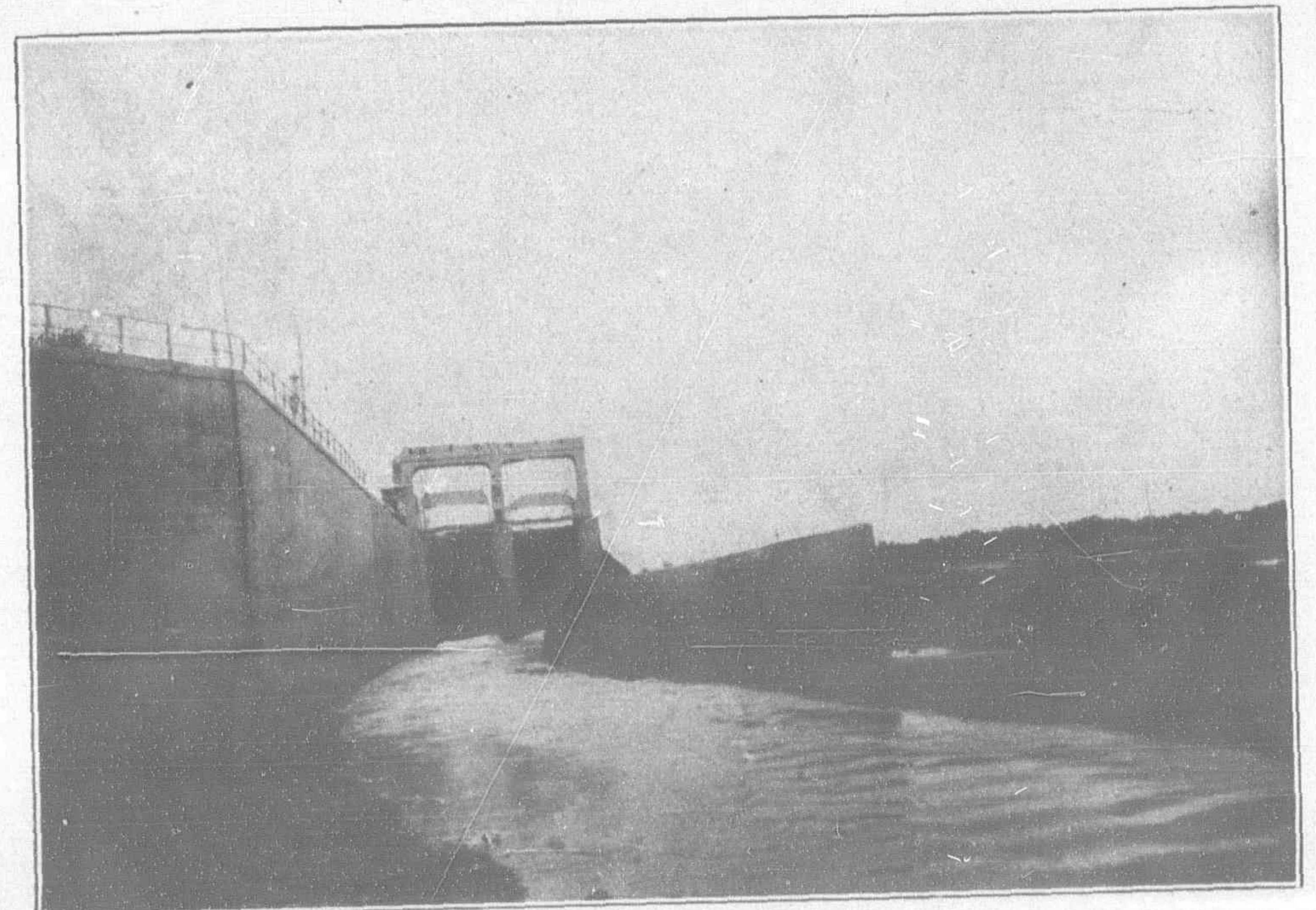


Looking at an Angle with the Dam Axis

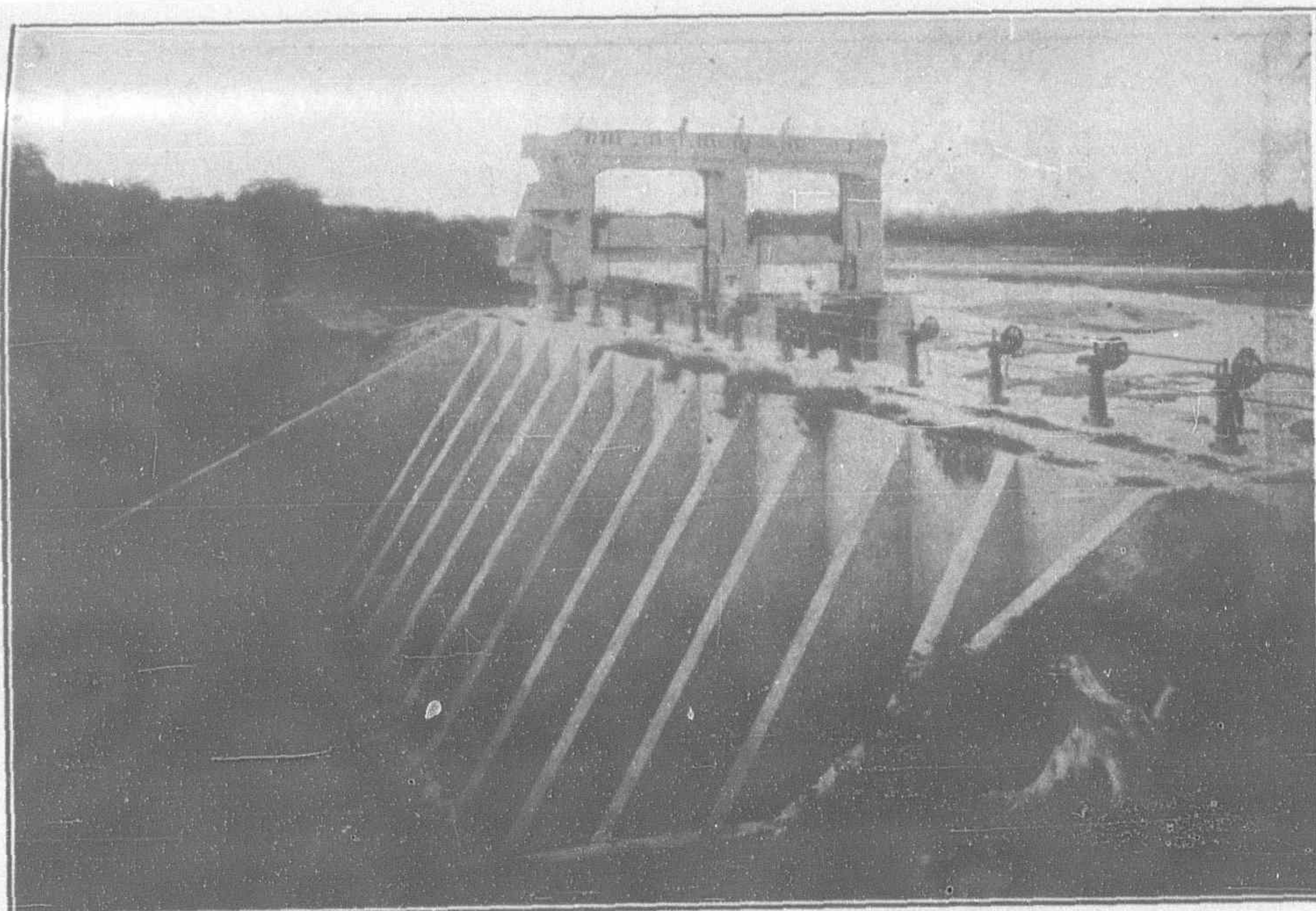


Downstream View of South Sluiceway Channel

SHOWING SLUICE GATES AND OPERATING PLATFORM



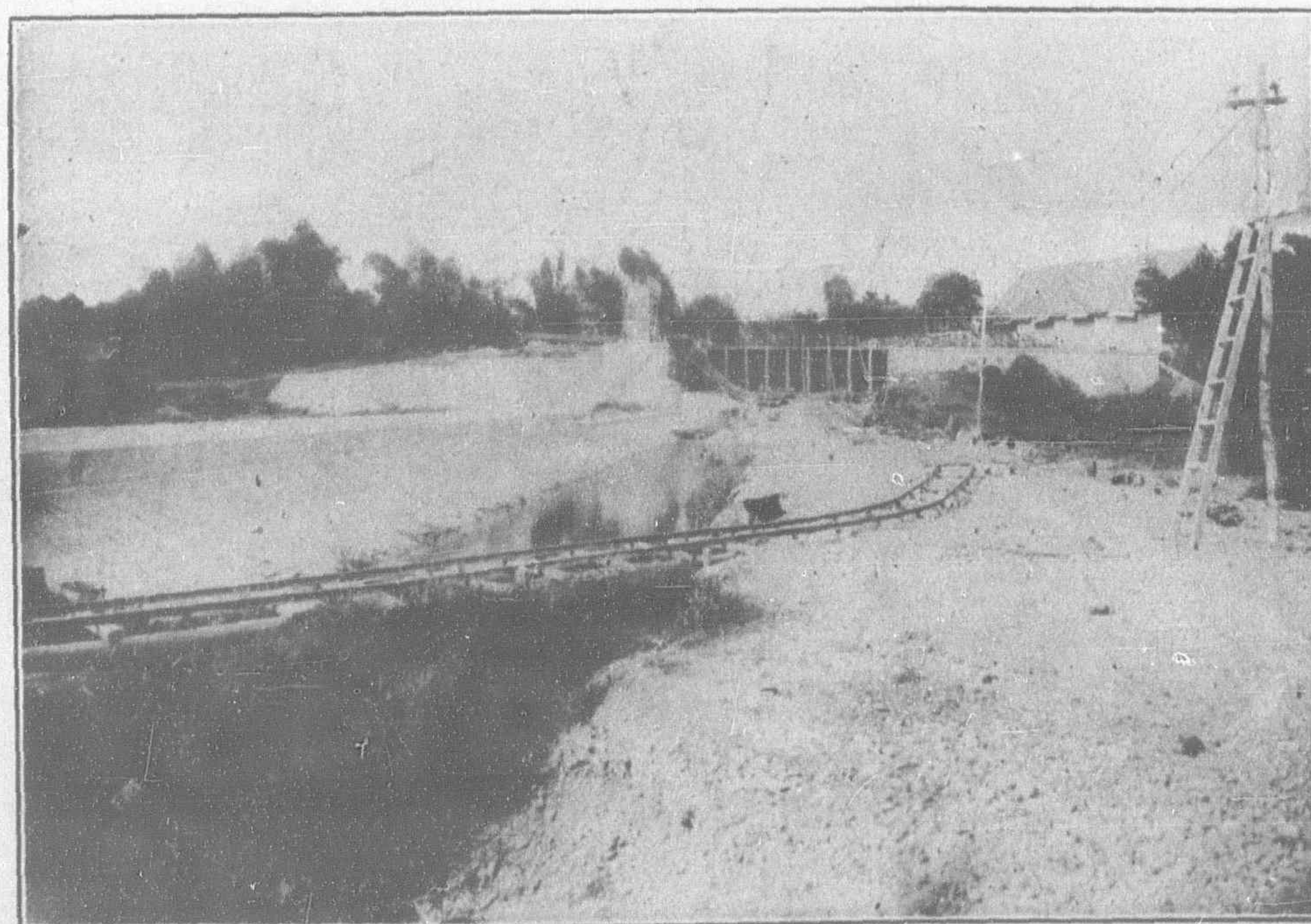
Upstream View of South Sluiceway Channel



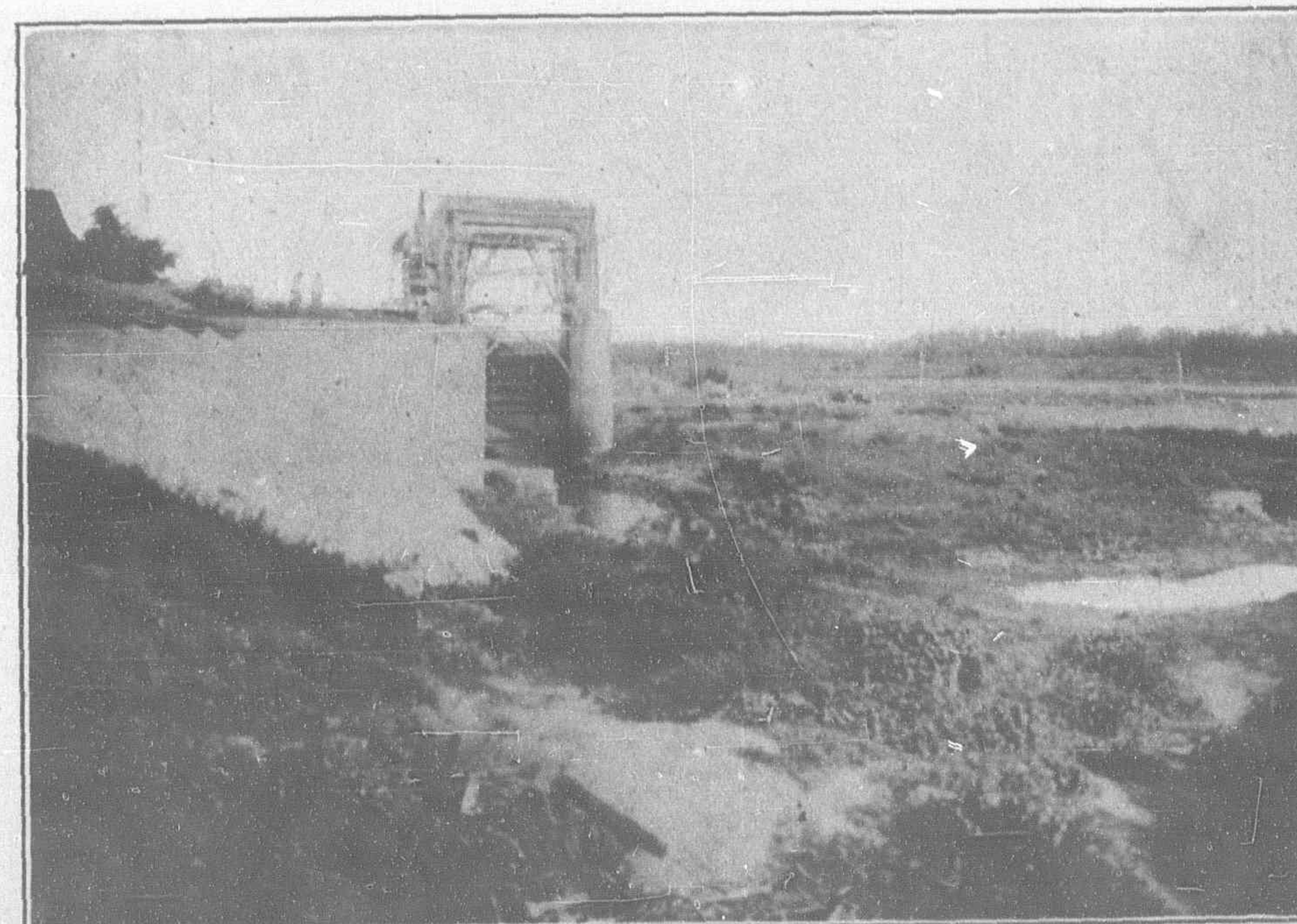
North Headworks Showing Gate Hoisting Devices and Operating Bridge for Sluice Gates



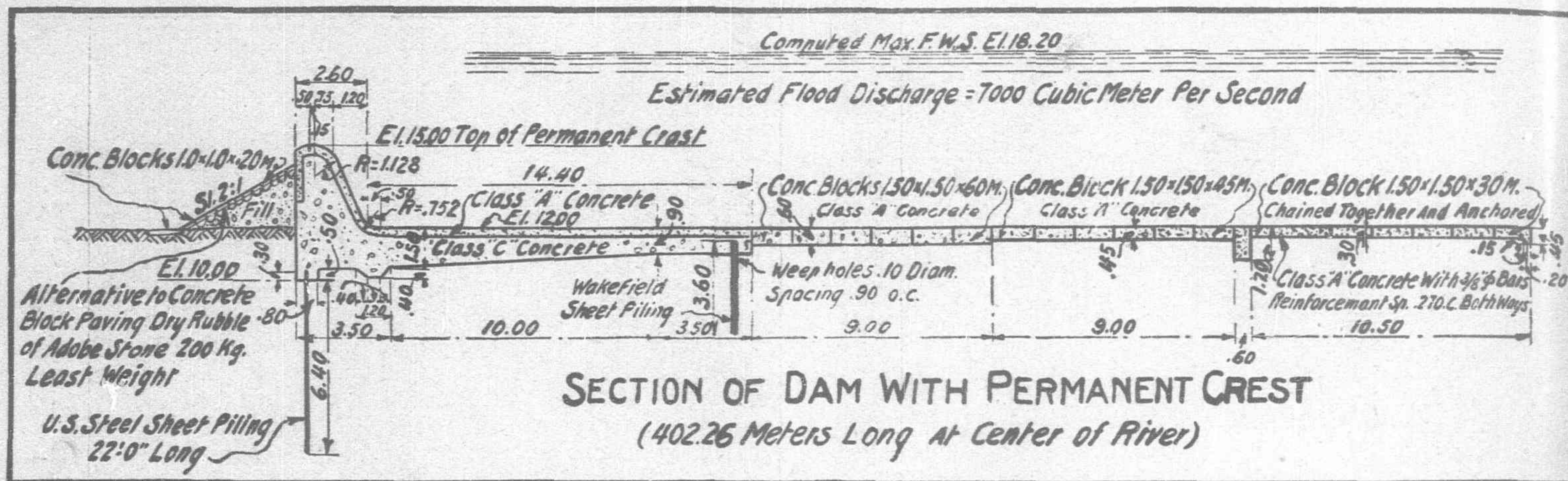
View of South Headworks Showing Uncompleted Dam, July 6, 1924



View of North Headworks, Showing Upstream View of Completed Portion of Dam. The Upstream Face of Dam is Protected with Inclined Concrete Block Paving, July 6, 1924

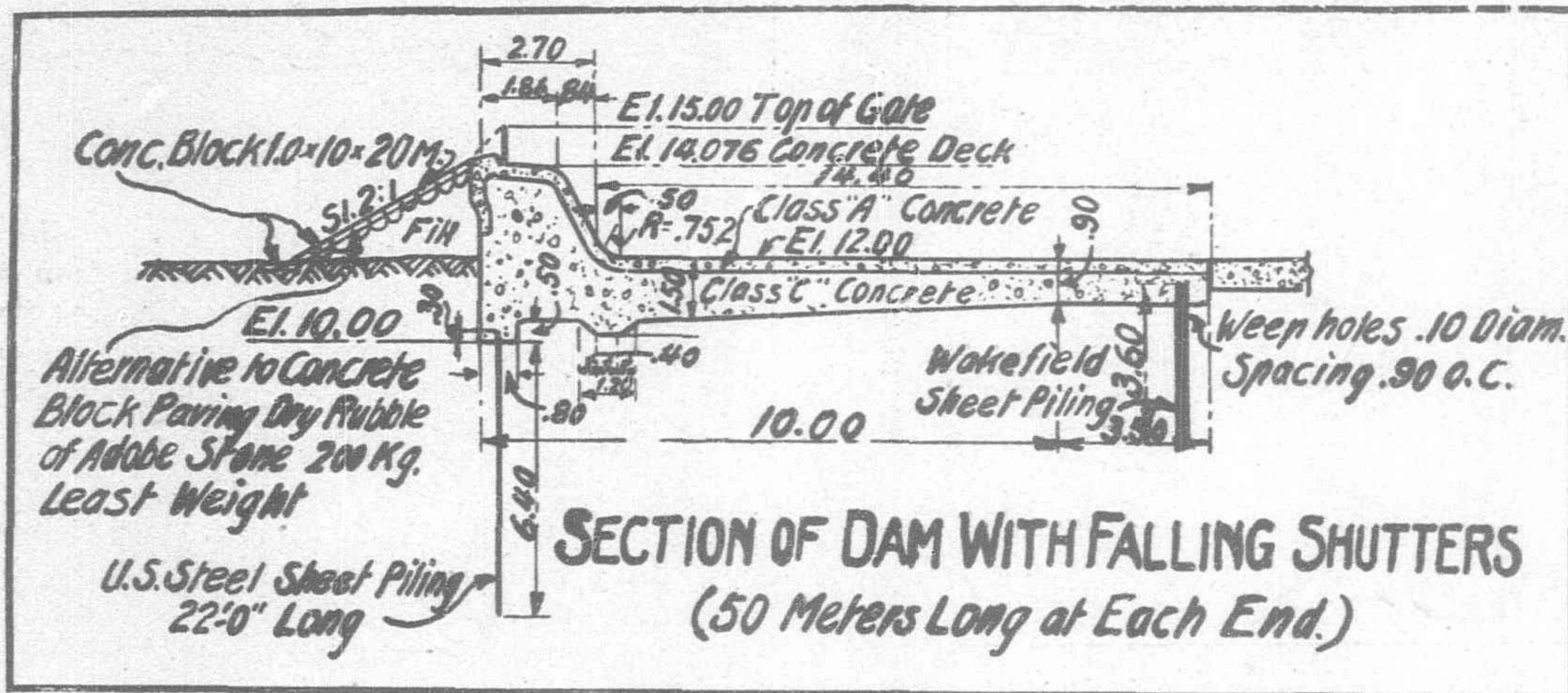


Downstream View of North Headgate Structure, July 6, 1924



south, and the delivery of water from these main canals through two distribution systems to lands on both sides of the Angat River.

The most important features of this system are the diversion works consisting of a low weir and two head-works, the north and south main canals provided with spillways and settling basins,

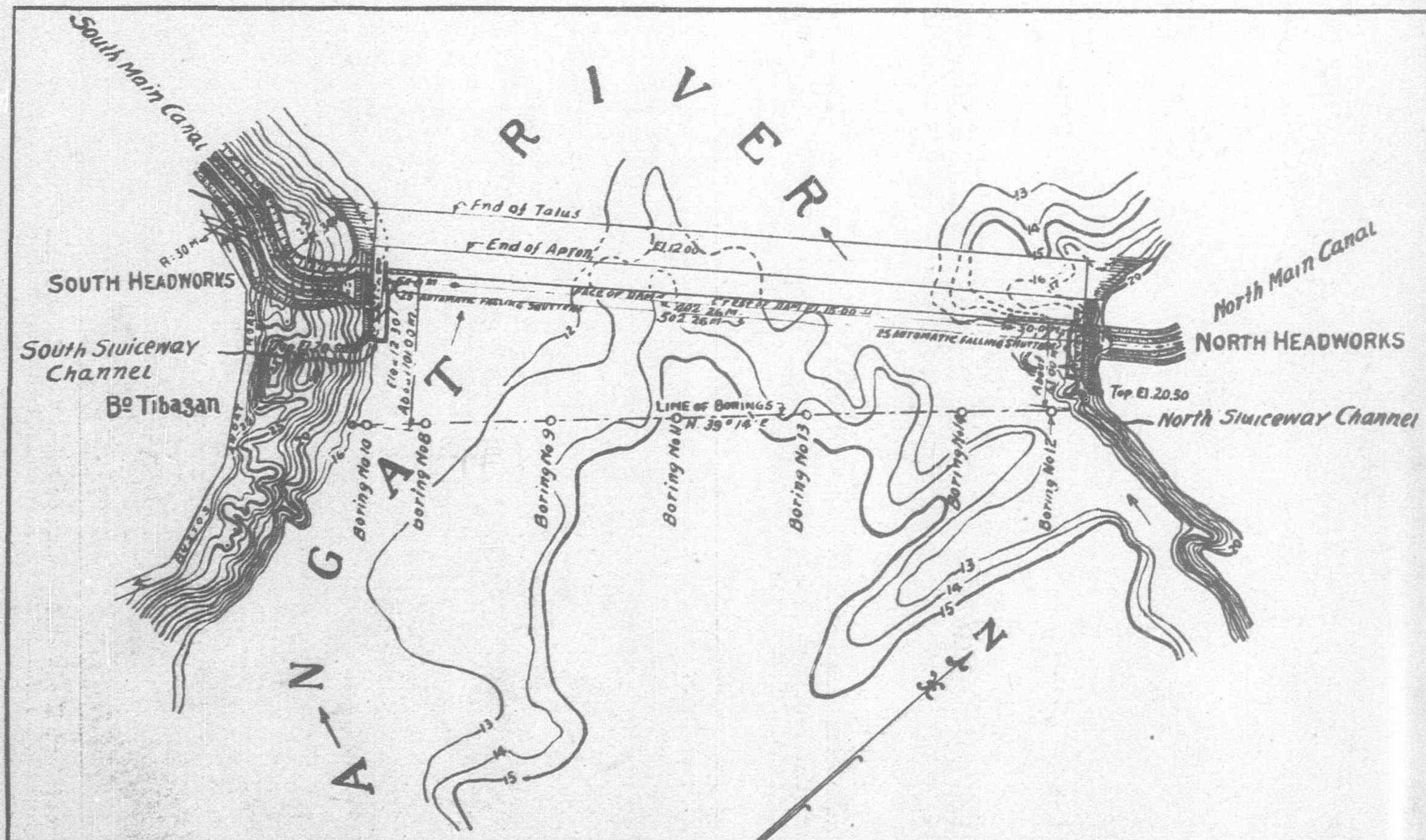


and the distribution system serving land with a very gentle slope and with numerous road, railroad, and drainage crossings. Reinforced concrete is used in all the structures.

Diversion Works

The works consist of a low diversion weir and of the north and south headworks

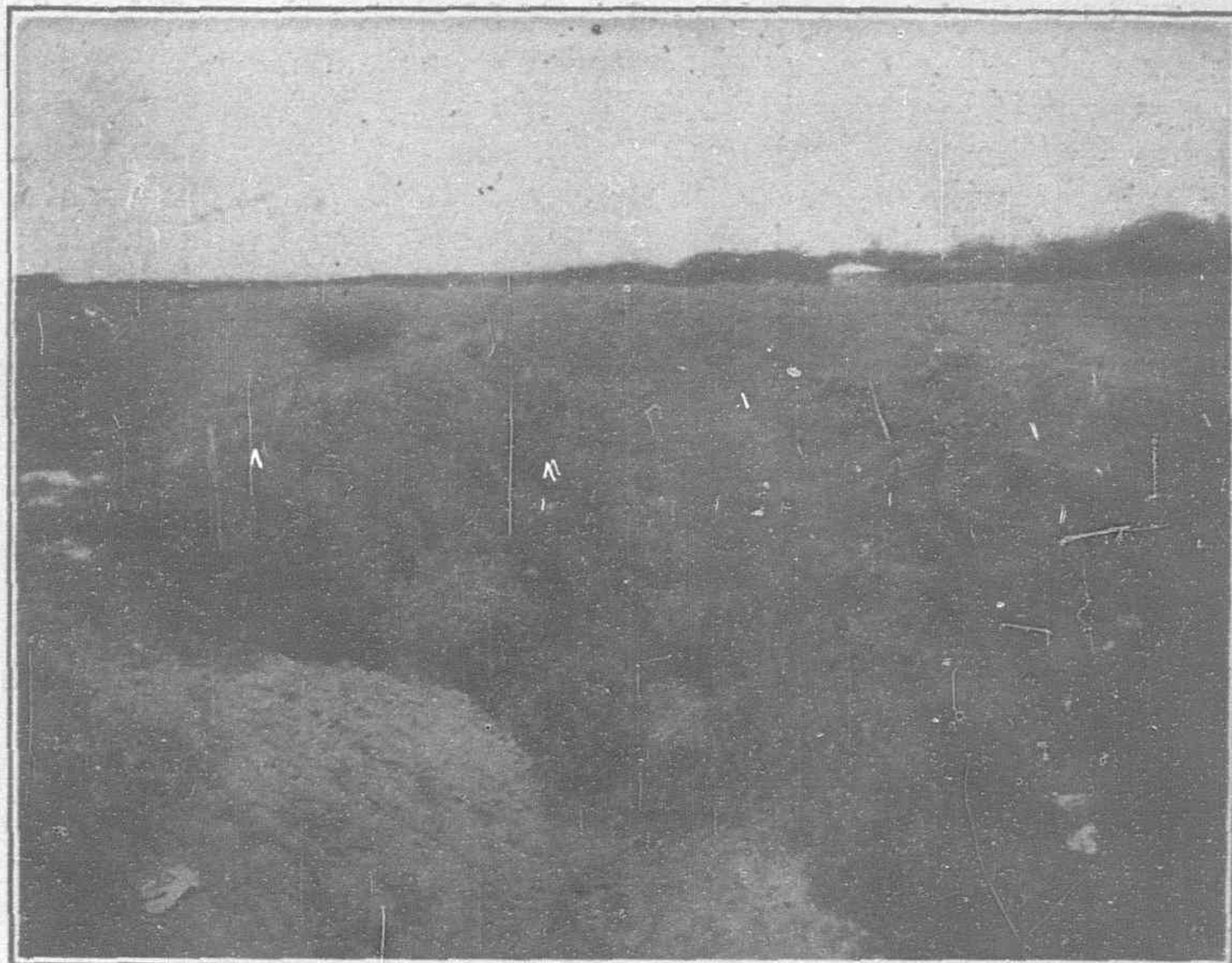
Angat River Irrigation System: Diversion Works, Sections of Dam



Angat River Irrigation System: Diversion Works, General Layout



Main Canal, Angat River Irrigation System, Feb. 14, 1924



View of Main South Canal at k.m. 10.37, Carrying Capacity 22,600 Second-liters, July 6, 1924

with their appurtenant sluiceway channels. The dam is 502 metres long between the piers of the sluiceway channels and is 3.00 metres high. It is built of class C, 1 : 3 : 6 : mix, concrete covered with a wearing surface of class A, 1 : 2 : 4 mix, concrete 30 centimetres in thickness, designed to stand the abrasive action of the sand and gravel carried by the floods. The weir rests entirely on sand and gravel foundations, which extend more than 13 metres below the river bed, the depth reached by the borings made. The row of steel sheetpiling 6.7 metres long shown on the heel of the dam and the long rear apron have been specified to lengthen the path of the water percolating beneath the dam, and thus prevent its undermining and decrease the hydrostatic uplift. The general design of the weir is similar, with a few modifications, to that in vogue elsewhere but particularly in India. Prominent among the features changed is the talus or paving below the down-stream apron of the dam which is thinner and shorter than that called for by the time-honored practice and the empirical formulas suggested by Mr. Bligh. The length of the lower part of this talus is proportioned in accordance with the depth of the maximum scour of the river determined from observations of its behavior during floods and not in accordance with the flood flow per unit width of crest and the height of the dam. The talus consists of square reinforced concrete blocks, 1.50 by 1.50 metres, decreasing in thickness from 60 to 30 centimetres. The lower 7 blocks linked together and chained to an anchor wall to prevent their separation from the main body of the

structure, from a flexible mattress that would adjust itself readily to scour. The length of the flexible portion of the talus is about twice the depth of maximum scour in the river. With this innovation a saving was effected in materials and labor over and above the design based on the standard practice of about 20 per cent, or approximately P.200,000.00.

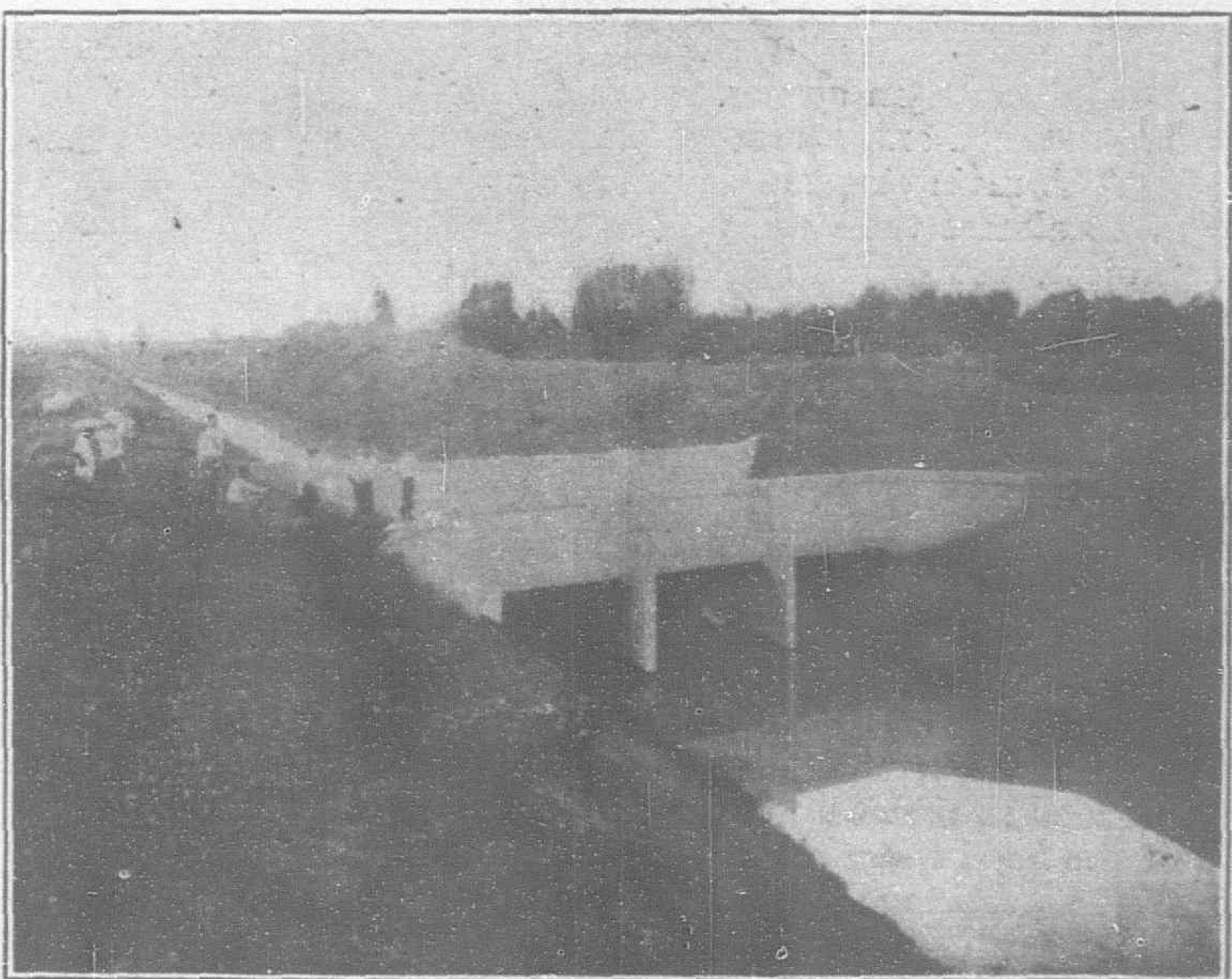
At each end of the dam there is a section 50 metres long provided with automatic falling shutters, each 90 centimetres high and 2 metres long, which are designed to fall with the rising flood and are intended to prevent the formation of sand and gravel bars in front of both headworks, and also to increase the capacity of the weir for discharging the flood flow. The maximum volume of flood is estimated to be 7,000,000 liters per second from a mountainous drainage area of about 870 square kilometres.

The headworks consist of the main canal headgates, which are designed to regulate the flow of the water entering the system, and of the sluiceway channels intended to remove the sand and gravel from the river waters flowing into the main canals.

A difference in level between the crest of the dam and the south main canal water surface of 30 centimetres, and 25 centimetres between the crest of the dam and the water surface in the north main canal, is provided to force the water through the headgates. There are 12 gates 60 inches wide and 48 inches high on the south headworks and 10 gates of the same size on the north side. The water will, by proper regulation of flashboards, enter both headworks with practically the same velocity as in the main canals.



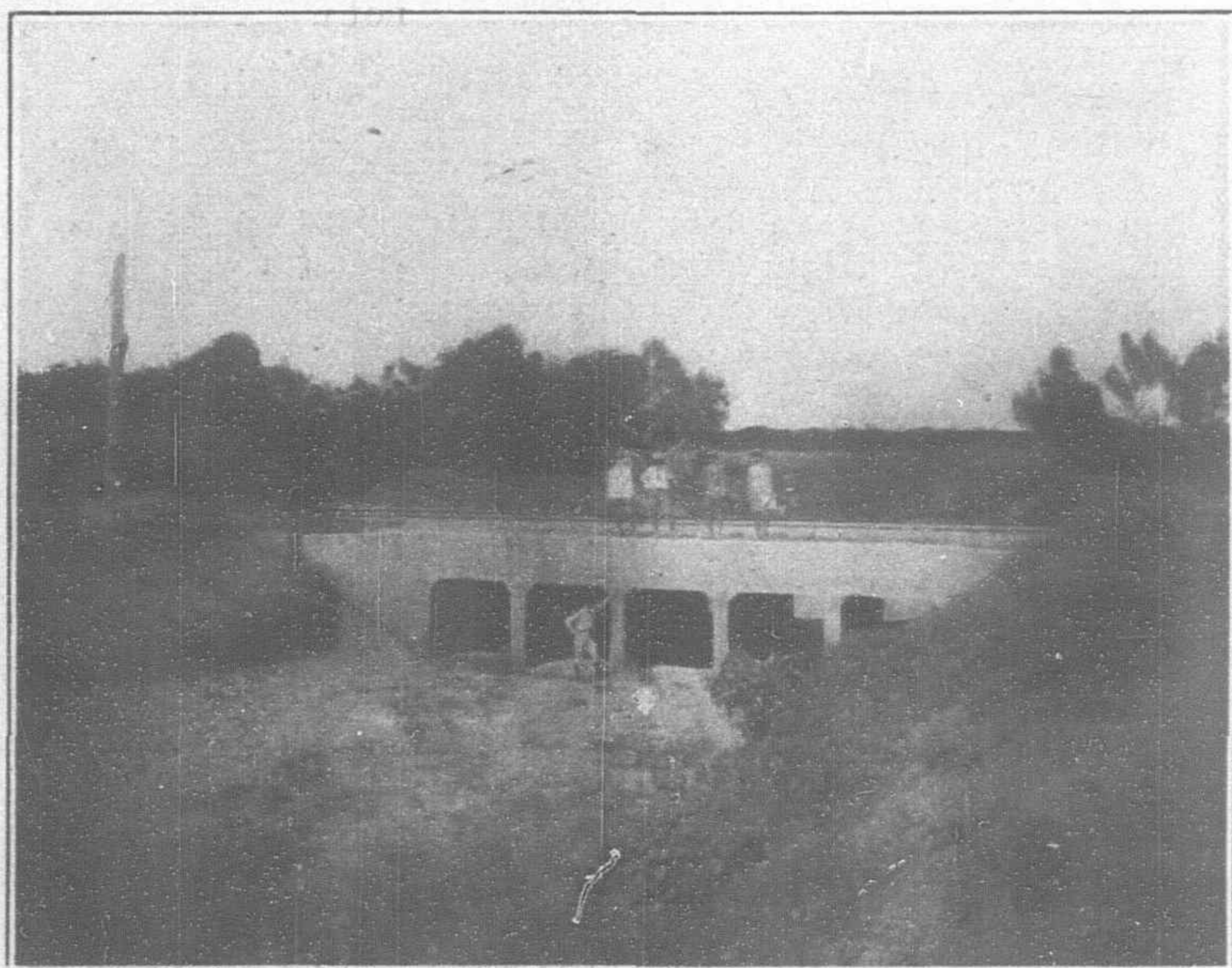
South Protective Dyke near its Upstream End, Connecting South Main Canal Bank at k.m. 9.39, July 6, 1924



Overhead Drainage Crossing over the South Main Canal at k.m. 1.60, July 6, 1924

The south sluiceway channel is 48.33 metres long and 13.50 metres wide. The channel is closed by two sluice gates of the Stoney type 15 feet wide and 10 feet high which are to be operated by hand. The north sluiceway channel is 39.88 metres long and 9.50 metres wide. This channel is closed by a Stoney gate, 20 feet wide and 10 feet high, also to be operated by hand. The bottom of the sluiceway channel is placed 1.20 metres below the sill of the gates in both the north and south headworks to give ample room for the deposition of sand and gravel. When the Stoney gates are closed and the water enters the main canals the velocity of flow in the sluiceway channels is about 60 centimetres per second which is far below the critical velocity. The deposits of sand and gravel accumulated in the sluiceway channels are removed by closing the main canal gates and opening the Stoney gates. The velocity of flow in the sluiceway channel, under these conditions and when carrying its normal capacity, is about 2.4 metres per second which is considered sufficient to scour out all the sand and gravel deposits.

The diversion weir including the sluiceway channels and the main headgate structures involves the excavation of about 70,000 cubic metres of sand and gravel; the placing of 23,340 cubic metres of reinforced concrete which requires over 35,300 barrels of cement and 325 tons of reinforcing steel; and of driving about 11,500 lineal metres of United States Steel Co. sheetpiling and 6,300 metres of Wakefield sheetpiling. The estimated cost of the diversion works is P.1,000,000.



Standard Reinforced Concrete Railroad Culvert on the South Main Canal at k.m. 13.64, July 6, 1924

Distribution System

The distribution system is divided by the Angat River into two units, north and south, which are similar in almost every respect. The main canals follow roughly the river banks from the intake to almost their ends. The banks are the highest lines of the project, the country sloping gently away from them. The south unit is protected from inundations by means of a dyke 16 kilometres long beginning from km. 9.39 of south main canal and ending at the railroad bridge over the Angat River near the town of San Marcos.

The south main canal is provided at km. 6.2 with an automatic spillway and escape which functions as a safety valve for the excess water entering the main canal, either from the river or from the hillsides, and protects the system in case of a break occurring in the lower sections of the main canal or in the laterals. The north main canal is also provided with spillways and settling basins at kms. 4.3 and 5.5. These spillways and settling basins are intended to take care of the surplus water entering the system, and of the flood waters of creeks utilized as portions of the main canal. The settling basins are designed to retain the sand and gravel carried by the floods of these creeks which are from time to time removed by opening the scouring sluices provided for in the same structures. The other main canal and lateral structures include lateral headgates, turnouts, railroad and highway bridges

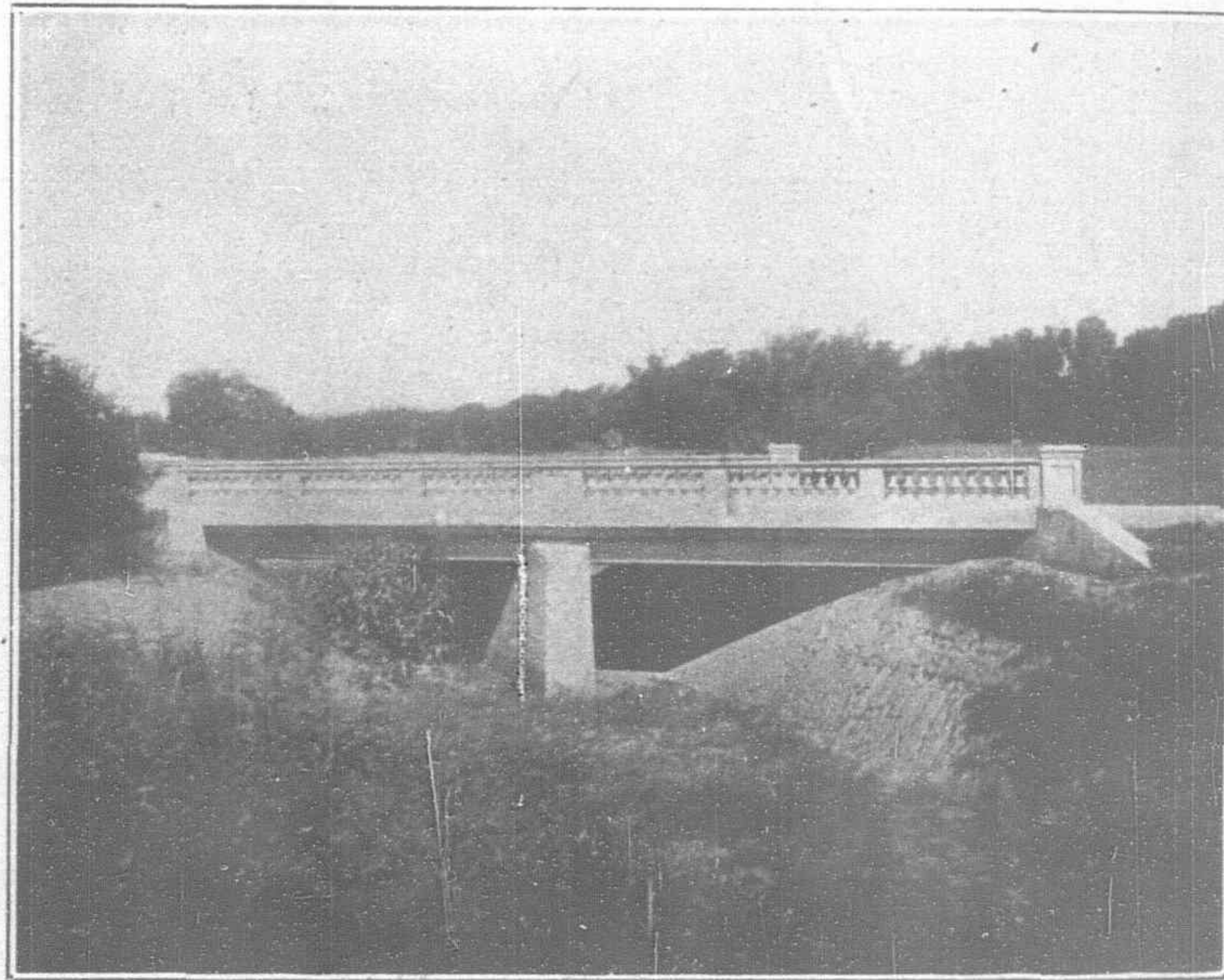
bull-cart crossings, checkgates, flumes, siphons, and other drainage crossings. To insure a scientific distribution of water provision has been made to measure the water in all turnouts and in all lateral headgates with a capacity not greater than 1,000 second-liters.

The south unit consists of a main canal 31.6 kilometres long and 174.4 kilometres of laterals and sub-laterals. There are 305 structures in all, with the exception of the turnouts which number over 1,000. The work consists of 1,080,000 cubic metres of canal excavation, of 160,000 cubic metres of earth fill for the dyke, and of placing 5,200 cubic metres of reinforced concrete involving the use of 10,400 barrels of cement and 190 tons of reinforcing steel.

The north unit consists of a main canal 22 kilometres long and 115 kilometres of laterals and sub-laterals. There are 205 structures, aside from the turnouts which alone number 660. The work consists of 680,000 cubic metres of canal excavation and of placing 4,800 cubic metres of concrete which involves the use of 9,200 barrels of cement and 160 tons of steel.

Construction Work

The construction plan of this project provided for the division of the work into five different parts, namely: Construction of the diversion works, excavation of the south side canal system, construction of the south side canal structures, excavation of the north side canal system, and construction of the north unit canal struc-



Reinforced Concrete Girder Bridge of two 8 metre Spans on the Mani North Road, near Quinqua over the South Main Canal at k.m. 13.90

tures. This scheme was adopted as funds could not be made available in a lump sum for the greater portion or the whole of the project, and work on each part was started as funds were allotted and final designs prepared. The construction of every feature was advertised for bids in compliance with Philippine laws and the award made to the contractor offering the most advantageous bid to the government, usually to the lowest responsible bidder. Prosecution of public works is done by force account in the Philippines, as a rule, only where reasonable bids are not received or expected.

The construction of this project was started in January, 1921, when the contract for the south main canal and distribution system, now completed, was awarded to the Atlantic Gulf and Pacific Co., of Manila, engineers and contractors. The construction of the diversion works is being carried out by Mr. J. B. Findley, an American engineer and contractor. The contract was signed in April, 1922 and the work will be finished by May, 1925. Unfavorable weather and unusual floods during the dry season of 1923 prevented the earlier completion of this work. The south side canal structures are being built by Mr. Romarico Agcaoli, a Filipino engineer and contractor, under a contract entered into in October, 1923, and are scheduled to be completed before the irrigation season of 1925. The contract for the excavation of canals of the north unit was awarded in January of this year to Mr. Carlos A. Barretto, a Filipino architect and contractor, and the work is expected to be completed early next year. Water will be delivered to all the

lands on the south side unit and a part of the north during the growing season of 1925. The construction of the canal structures on the north side will be advertised for bids before the end of the year. It is expected that these structures will be completed and the whole system officially opened by the end of next year.

The unit cost of excavating ordinary earth, the prevailing material in the main canals and distribution system, dropped from P.0.777 to P.0.42 per cubic metre. The former price was paid the Atlantic Gulf and Pacific Co., for a great portion of the canal excavation of the south side unit, and the latter is roughly the average paid for the canal excavation of the north side unit. The high wages prevailing in 1920 account for the higher contract price, which was considered reasonable at the time. Concrete work in the body of the dam cost about P.24.00 a cubic metre for class C concrete and for class A concrete about P.30.00 per cubic metre, the price of cement having steadily gone down from about P.8.50 to P.6.00 a barrel. About P.0.26 per kilo was paid for steel in place. The price paid for concrete for the south side canal structures varied from P.49.50 to P.61.60 per cubic metre depending upon the size and location of the structure. These prices were and still are considered very favorable to the government. Wages of common labor in the project oscillate between P.0.80 and P.1.20 a day of nine hours.

The surveys, the preparation of plans and the supervision of construction work were done by the irrigation division, bureau of public works, of which Mr. A. D. Williams is the director.

Estimate of Cost and Summary of Data

The following tables are included to show a summary of the main features of work involved and the itemized estimate of cost. The cost of this system was originally estimated to be P.4,500,000, but owing to the fall of prices of labor and materials and to savings effected in the final design of the dam and canal structures, and in the elimination of a tunnel 560 metres long proposed originally below the south headworks, it is believed that the system will be completed at a cost of not more than P.4,100,000, which is P.400,000 below the original estimate. The cost per hectare on the basis of the 22,500 hectares that will be actually irrigated, out of the 25,000 hectares irrigable, is P.200.00, according to the original estimate of cost, or P.182.22 according to the revised estimate.

Angat River Irrigation System Revised Estimate of Cost

Diversion Works	P.1,000,000
South Side Unit:	
Excavation of main canal and laterals	P.957,000
Earth embankment for protective dyke	65,000
Main canal and lateral structures	350,000
" " " " gates	47,000
Right of way	132,000
	1,551,000
North Side Unit:	
Excavation of main canal and laterals	291,000
Main canal and lateral structures	330,000
" " " " gates	33,000
Right of way	90,000
	744,000
Miscellaneous:	
Expenses of engineering field force	330,000
Additional sub-laterals and contingencies... ..	135,000
Overhead charges of bureau of public works, 9%	340,650
	805,650
Total	P.4,098,400
Say	P.4,100,000

Summary of Data on Angat River Irrigation System

	Diversion Works	South Side	North Side	Total
Cubic metres of excavation	70,000	1,080,000	680,000	1,830,000
South protective levee 16 km. long cubic metres of embankment		160,000		160,000
Length of main canal in kms....		31.6	22	53.6
Length of laterals and sub-lats. in kms.		174.4	115	289.4
Number of structures (turnouts excluded)		305	205	510
Number of turnouts		1,000	660	1,660

	Diversion Works	South Side	North Side	Total
Cubic metres of concrete—				
Class A	4,900	5,200	4,000	14,100
" B	740			740
" C	17,700		800	18,500
Kilos of reinforcing bars	325,000	190,000	160,000	675,000
Barrels of cement	35,300	10,400	9,200	54,900
Cubic metres of rip-rap paving		120	90	310
Cubic metres of concrete block paving... ..		30	20	50
Thousand B. ft. of lumber, ipil		1	1	2
Thousand B. ft. of lumber, yacal		27	18	45
Linear metres of concrete pipe from 12" to 30" in diameter		1,250	850	2,100
Length of steel sheetpiling in metres	11,500			11,500
Length of Wakefield sheetpiling in metres	6,280			6,280

Financing and Control of the System

The entire work is financed by the government but the total cost of construction with interest at 4 per cent., is to be reimbursed by the landowners benefited in 40 equal annual instalments from the date of completion of the system. It should, however, be stated here that the cost of irrigation works approved for construction after March 8, 1922, when the issue of P.20,000,000 worth of bonds was authorized by the Philippine legislature for the construction of irrigation systems, is to be reimbursed by the landowners benefited with 6 per cent., interest in not more than 20 equal annual instalments. These charges are collected like land taxes and are a lien upon the lands included as irrigable under the project. The system will be operated by the director of public works at the expense of the landowners until it is fully paid for, after which the control and management of the system may be turned over to the water users after organizing themselves into an irrigation community in accordance with the provisions of the national irrigation act. The total annual charge, computed on the basis of the original estimate of cost, to be collected from the owners of irrigable lands is P.21.34 per hectare and consists of the following items: Cost of construction charge, P.5.00; equal annual interest charge, P.5.10; estimated yearly cost of operation and maintenance, P.2.00; and P.0.24 for insurance, which is 2 per cent. of all the preceding items, to be used for repairs to, or reconstruction of, any portion of the system damaged or destroyed by a fortuitous event or *force majeure*.

Social and Economic Considerations and Prospects

The construction of this system was decided upon only after ascertaining the favorable attitude of the landowners to be benefited. The provincial and municipal officials concerned acting in behalf of their constituents passed resolutions requesting the development of this project. Following the procedure prescribed by the irrigation act, its construction was advertised in the official Gazette and in the local newspapers and notices were published in all the towns affected and read before the people by public criers for one month and no protests were received by the secretary of commerce and communications of the Philippine cabinet during the three months' period, following the advertisement, set for filing such protests. The people are well aware that the construction of the system represents to them a profitable investment as the expected returns are higher than the total annual charge for the cost of construction, interest, operation and maintenance, and insurance. The increase in production is conservatively estimated at P.25.00 per hectare, whereas the total annual charge amounts to only P.12.34 per hectare which is to be collected for forty years. An additional income is expected from raising dry season crops, such as mongo, vegetables, corn, and others which is made possible with irrigation. A second crop of rice is not encouraged as it is not deemed advantageous to the landowners themselves aside from the fact that the water supply is insufficient.

It is estimated that the total rice production on the whole area will increase approximately from 31,000,000 to 44,000,000 kilos, even if the present methods of cultivating the soil, harvesting, and marketing the products should prevail in the future. Steps are being taken, however, to increase the present relatively low yield of irrigated fields to the level of production of the most progressive rice regions by carrying out a vigorous campaign of education and demonstration to improve farm practice and marketing methods.



The Potala, Palace of the Dalai Lama in Lhasa, which now has Telephones and soon may glow with Electric Lights. Below this Frowning Stronghold Lies the City of Lhasa Through which the New Telegraph and Telephone Line Now Runs

Hello Central—Give Me Lhasa!

Dalai Lama Installs Telephones in the Potala; Telegraph Finally Invades Thibet to Great Delight of His Holiness' Prime Minister Who Now Plans Hydro-Electric Lighting for Palace and Streets

SHORTLY after the British government, through an agreement signed in 1904 with the Tibetan authorities and confirmed in 1906 by China, secured the right to trade in Gyantze, a Thibet, a telegraph line was built connecting this point with the Indian telegraph service. The construction of this line was provided for in the agreements.

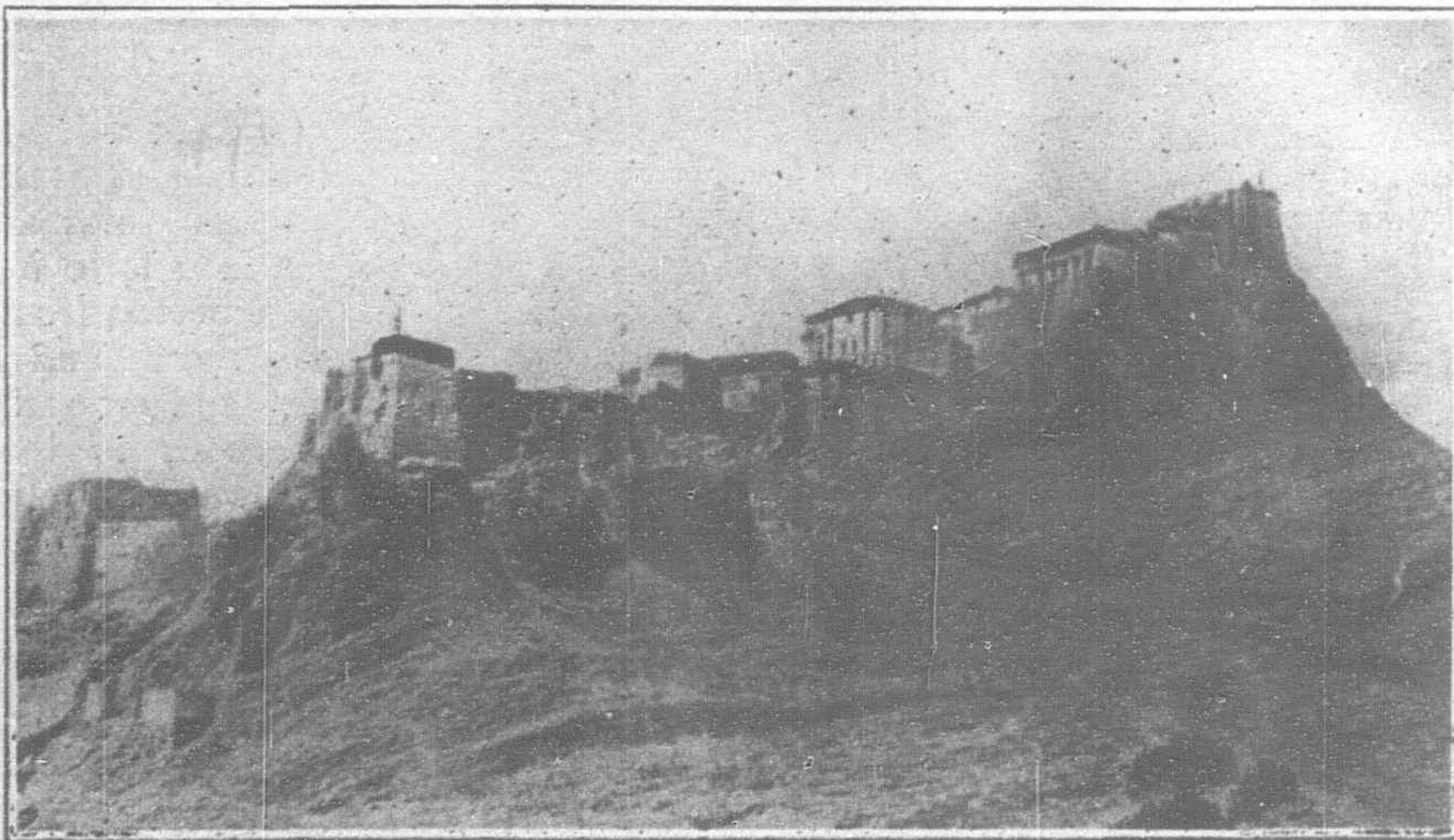
After Thibet become virtually independent, following the driving out of the Chinese troops in 1912, the suggestion was made that the telegraph line should be extended to Lhasa. Nothing was done in this matter until 1921, however. A British engineer, at the request of the Thibetan government, then made a survey. In the following

year the construction work on the Gyantze-Lhasa section was begun.

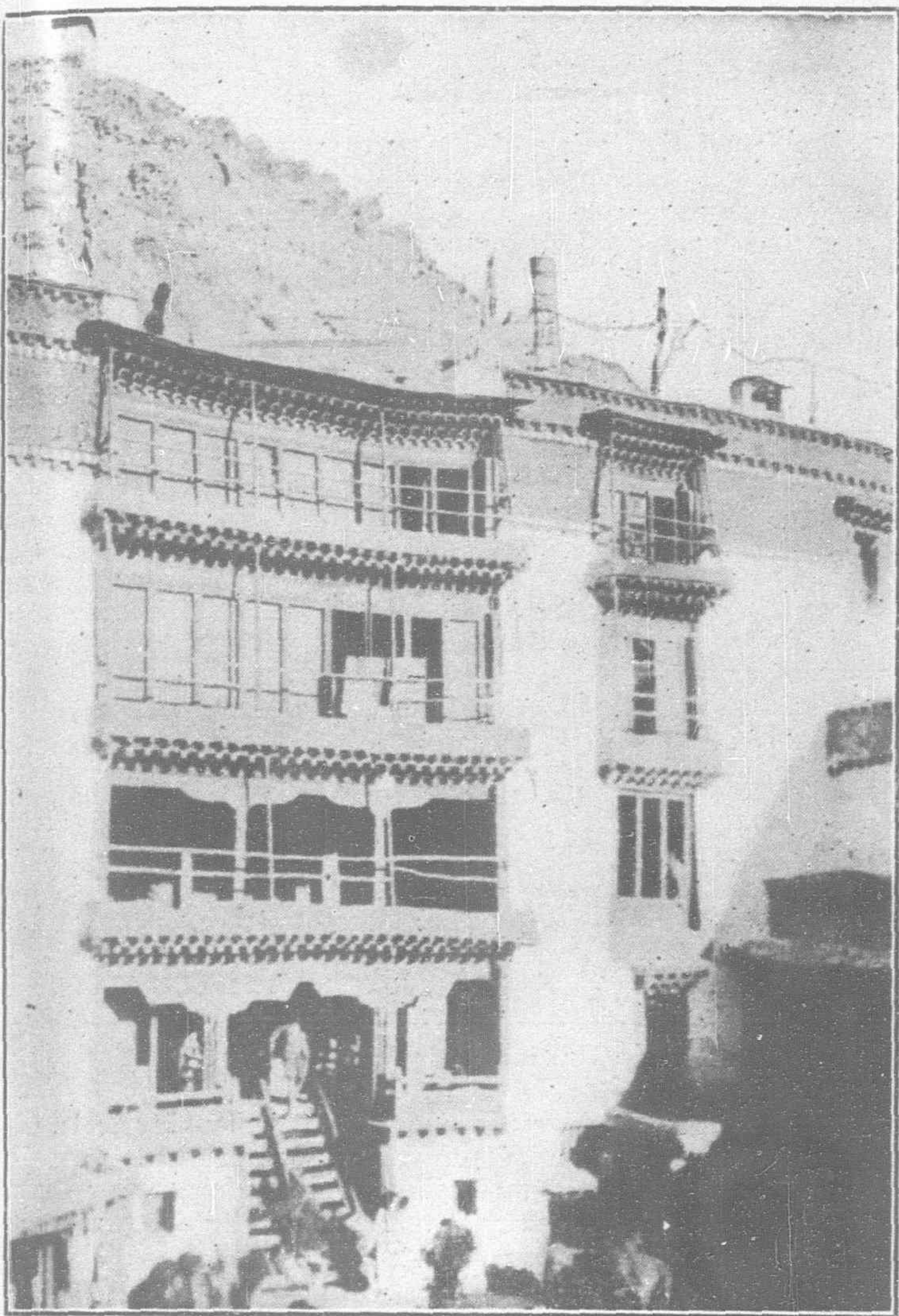
Mr. W. H. King, who was in charge of the construction however, himself gives a full account of his undertaking in an article which appears in the June, 1924, issue of the *Geographical Journal* which is published by the Royal Geographical Society, London.

Mr. King's article in full is as follows:

The idea of extending the line from Gyantze 144 miles to Lhasa was conceived by the Tibetan government. They purchased the wire, brackets, and insulators from us, and supplied their own wooden poles and labor in addition to paying the wages of the twenty-two head coolies recruited by us. The Indian government lent



Gyantze Jong where the New Line to Lhasa Joins the Indian Telegraph System



Home of Thibetan Noble who is Installing Phone Connection with the Potala

them the services of on deputy assistant engineer, a supervisor, and the four linesmen.

The poles of the Lhasa line are of wood of a light type but, their transport was a stupendous task. In many cases they had to be carried by manual labor 60 miles to the site of the line, one village taking them on to the next. I saw teams of six villagers, husband and wife, two sons and two daughters, harnessed to three poles and carrying them along. The Thibetans distributed the material along the line, and I was given a further supply of eighty coolies for the work. All the transport and labor worked gratis for the Thibetan government. The estimate allowed three months for the work, but thanks to the very sensible specification of the material prepared by Mr. J. Fairlay, divisional engineer of telegraphs, after his survey in 1921, the success of Col. Bailey in getting the Thibetan government to realize the need for quick action if they wished to keep within the estimated expenditure, and the splendid arrangements made by the Thibetan authorities, the line was completed in five weeks at an average rate of 4 miles per day. For these arrangements the Thibetan trade agent, a lama of high degree at Gyantze, is primarily responsible. Four Thibetan gentlemen were sent with us for training as linesmen, but as their social status was too high for the class of work, four men of the peasant class were trained instead. Of the four gentlemen two, named Keesoo and Jorkay, were recommended to the Thibetan government for employment as supervisors.

In order to prevent trouble with the Thibetans, to serve as a mentor for Thibetan etiquette and customs, and to act as interpreter, a young Thibetan aristocrat named Kyipook was sent along with us. He is one of the four young Thibetan gentlemen who were sent to Rugby in 1914 for education. On his return he was given a further training in civil engineering in Roorkee engineering college, and than a year's training in telegraphy at Kalimpong. He proved very useful, and, thanks to his genial and kindly nature, everything went

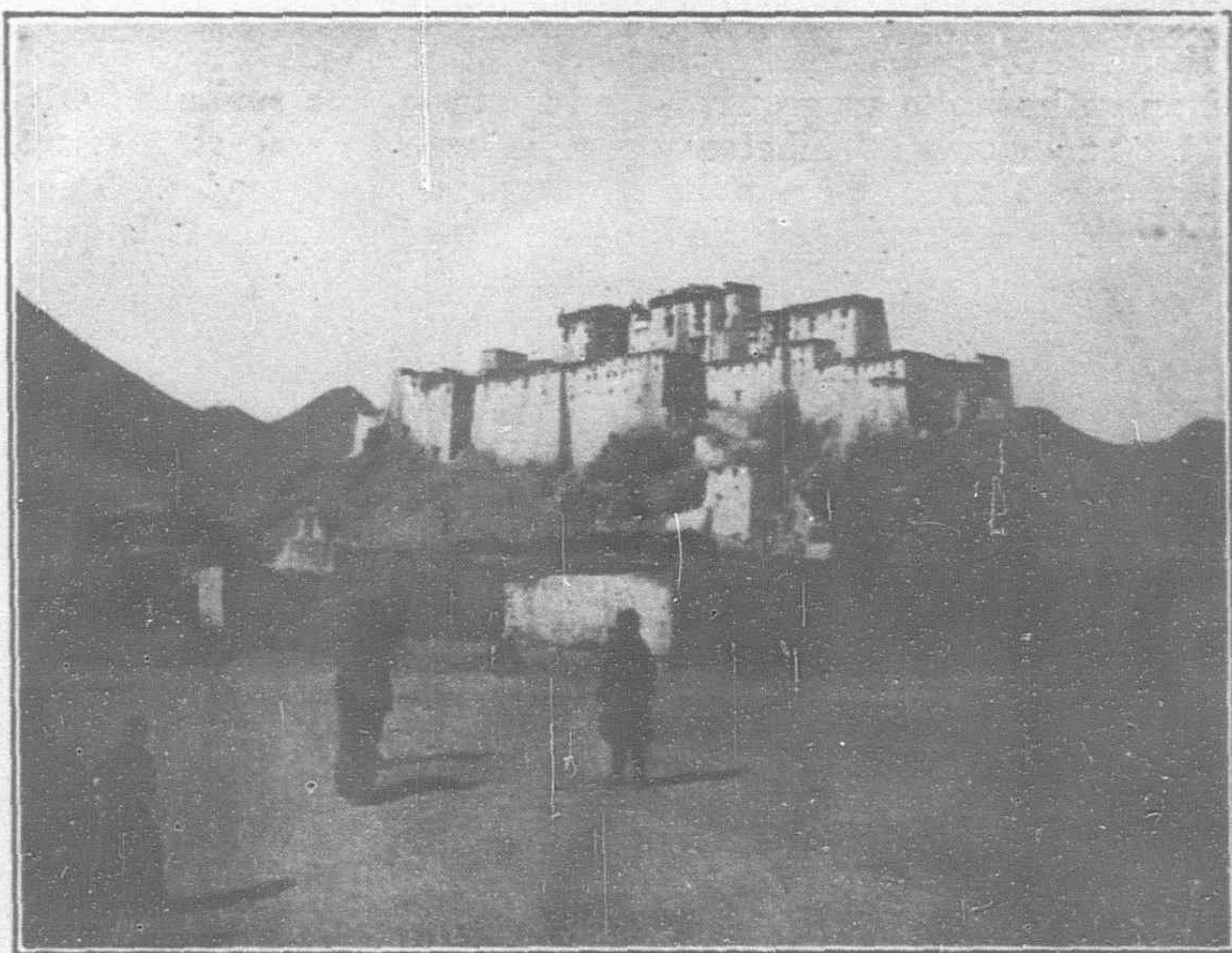
off without a single dispute. He has been selected to be the director of the telegraph and telephone in Thibet.

I was told that the Thibetan laborer was slow, stupid, and indolent, but I found him to be the best worker I have yet seen in my experience of labor in many parts of India and East Africa. In lieu of taxation Thibetans perform government work without pay. For the telegraph line, therefore, the labor and transport had to be changed in every district. A large pile of stones on each side of the road marks the end of one and the beginning of another district. Under no pretext will a villager from one district work beyond his boundary. In spite of the privations which hard work under such trying conditions caused, I always found them happy and contented. The Thibetan laborer is quick to grasp what is required to be done, and quick to perform it.

He is very submissive, cheerful, and polite. His position in life is very humble; he must pay very deferential respect to his superiors, and when he approaches any of them take off his cap and hold it in both hands, bow his body forward, and loll his tongue out and remain in that posture until dismissed. He, however, possesses a lease of land, flocks, and herds which yield him and his family ample supplies; so he goes through life with a full stomach, and is perfectly contented.

The completion of the line was looked upon as a great event by the inhabitants of Lhasa, and on the day on which the line was taken through the city the streets were crowded with people. The line was very favorably received all round except by those along whose fields it went, and the reason for this exception is that the owners thought they would be held responsible in case the posts broke. The Lamas gave us a friendly reception throughout, and in one case where the line had to be taken through the grounds of a monastery, the Lamas in occupation were very helpful. When within 3 miles of Lhasa the Thibetan council sent a messenger asking me to avoid the main road for the last 3 miles and to enter Lhasa from across country, the reason assigned being that the Lamas from the two big monasteries of Drepon and Sera pass frequently along the road, and the younger men might be tempted to smash the insulators, just as they used to do with a Chinese line years ago. But the general effect of the line on all classes was one of pride that Thibet had telegraph and telephone lines at last, and that they would no longer be the laughing-stock of Chinese and Japanese merchants and pilgrims.

The Potala and the large Buddhist temple now have telephones in them connecting the offices of the prime minister and council chamber with the Dalai Lama's summer palace. We were allowed to wander freely over these buildings, and given permission to photograph everything except one image in the cathedral. The majority of the shopkeepers are Nepalese, and there are also a few Ladakhi Mohammedans. The latter, I was told, are noted for their sobriety and good behavior. I found them good fellows, but in the habit of putting on prices tremendously. Their leader Khan Saheb Faizulla was very helpful arranging our financial affairs by getting his agent to draw our money in Gyantze and paying us in Lhasa, and also in getting his brethren to sell at reasonable prices.



The Citadel and Telegraph Office at Shegatse Jong

The first telegraph master of Lhasa is Mr. Sonam Tsering, sent on deputation from the Indian department. He is Thibetan by birth but a Christian by religion, educated in Kalimpong and Darjeeling. Except for him the line is worked by Thibetans. Two Lamas are undergoing training in telegraphy in Kalimpongs and on their passing out will relieve the Indian telegraph master. The system will then be managed and worked entirely by the Thibetan government. The telegraph system is used almost entirely by the Nepalese and Ladakhi Mohammedans and a few Thibetan merchants, the majority of Thibetans not having any use for it. But the telephone is very popular with the Thibetans, and whenever opportunity affords the chance of a chat with a friend or relation on the outside they avail themselves of it eagerly, and it is difficult to get them to end the conversation once they start. The post and telegraph system in Thibet is managed by joint postmasters-general, one a Lama and the other a civilian. The postal system is fairly good and letters are regular. They have a system of runners worked on our Indian system, and I have often seen these men running their beat of 5 miles with the short spear and bells of the Indian runner.

The Buddhist priests of Thibet are called Lamas, and it is the invariable custom that at least one male and one female from every family be dedicated to the life of a Lama. The prime minister is an old gentleman of over sixty years of age, of august bearing and charming manners. He is a Thibetan of the old school, and a firm believer in the greatness of Thibet and the goodness of the Buddhist religion, with an unwavering belief in its gods and dragons. It was easy to interest this charming nobleman, as he possessed intelligence of a high order, and had visited India with the Dalai Lama and had seen a good deal of our modern inventions. His courteous manner displayed itself in a delicate style of flattery. When talking about the telegraph-line he said, "Your department has erected a monument in Thibet which can be seen for miles and appreciated by all. Thousands of pilgrims will come from China, Japan, Manchuria, and will realize that at last Lhasa possesses telegraphs and telephones, and on their return home will spread the news and the name of the builder all over the East." Talking in this connection, he said that there was a waterfall 4-miles out of Lhasa which offered the means for working a large hydro-electric scheme for lighting Lhasa. At the same time he said a young Thibetan was learning electrical engineering in London and on his return a scheme for lighting Lhasa was to be undertaken. It was his great ambition, he said, that God would spare him long enough to see the streets of Lhasa lighted with electricity.

Tsarong Shape, the commander-in-chief, is the Dalai Lama's favorite councillor and his constant companion. He has a short, tough, wiry figure, and looks every inch a soldier and a leader. He possesses intelligence of a high order and a happy, vivacious disposition. He is very easy to interest, as he loves to listen to military, police, and diplomatic exploits, and takes a keen interest in everything western, and is quick to understand its use, I found his house full of engineering instruments of all descriptions. He is an expert photographer and takes and develops his own plates. His daughter is being educated in a girls' school in Darjeeling.

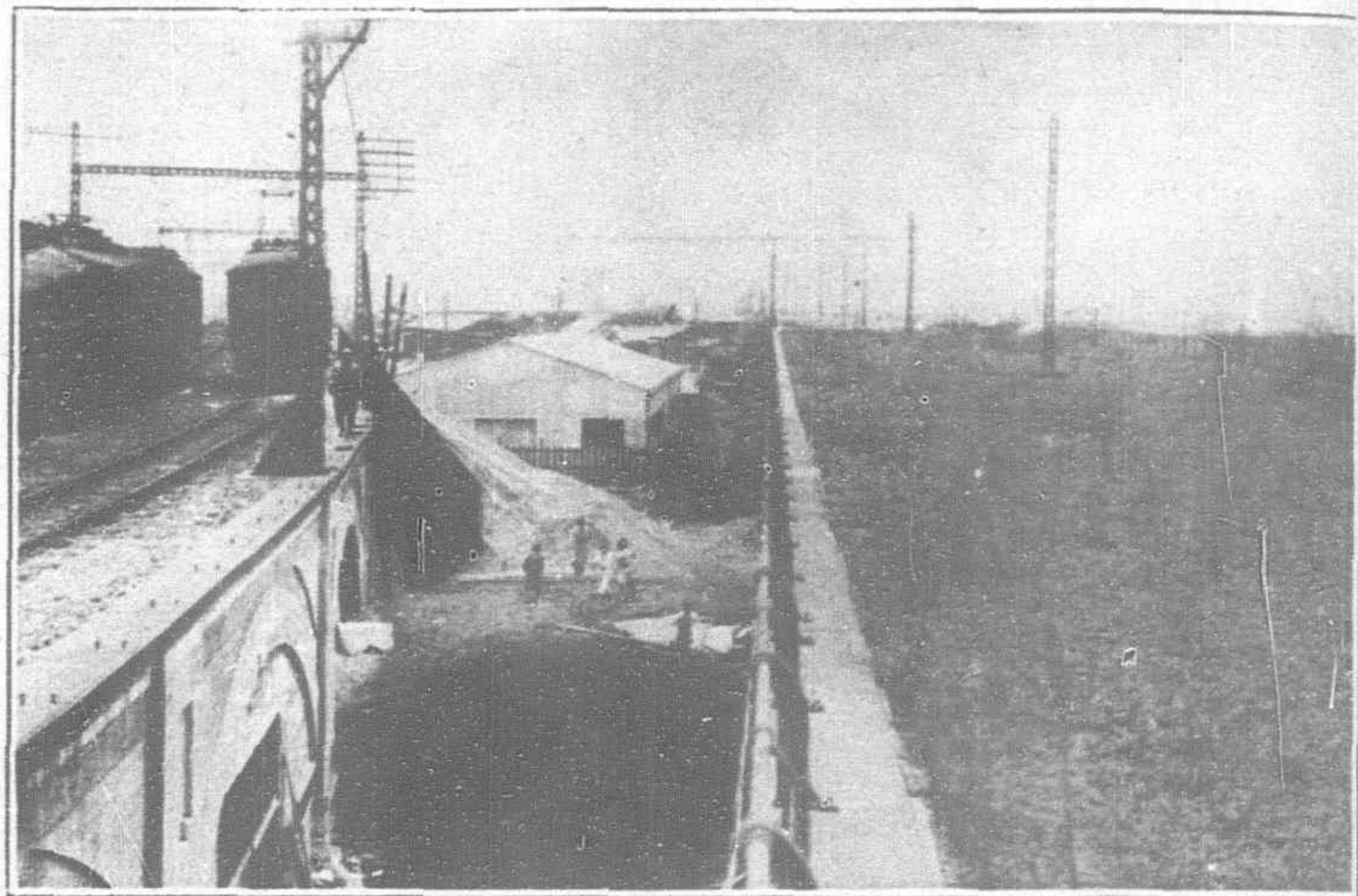
I came in occasional contact with a few military officers. Their uniforms are entirely British, and all of them cut smart figures in them. Surkong Depon (colonel) is the mint-master of Lhasa, and an enthusiastic progressive like his master the commander-in-chief. The modern Thibetan army is well-trained and smart. They have a fife-and-drum band, bagpipes, and bugles. These can compare with some of the best Indian regiments. It is quite inspiring to see the battalions fix bayonets, present arms to his holiness to the tune of "God Save the King," which the Tibetans have adopted as their national anthem, and march away with gorgeous yellow satin banners flying to the tune of "The girl I left behind me."

The Dalai Lama took a keen interest in the fixing of his telephone, and pointed out the exact position where he would like it. A large battery was needed as the bell was of the battery-ringing type. He sent for his carpenter and ordered a box for the cells from his own design. The carpenter delivered the box ready with partitions in 20 minutes. We had no dry cells and had to prepare a battery by putting perished dry cells into a solution of salammoniac. We had no jars, and his holiness promptly satisfied this want with highly glazed Japanese flowerpots, which he cheerfully sacrificed. To enable him to use one telephone on two circuits at will, I designed a plug-switch which the court blacksmith promptly made up from brass. The plugs needed an insulting handle, and his holiness

Elevated Line To Link Tokyo Railway Stations

The foundation work of the Japanese government elevated line, which will connect the Kanda station with the Ueno station, thereby linking the Tokyo station with that for the northern lines, is now making a good progress. This work will be completed in the spring, and the railway services will be opened in early autumn, next year.

The total distance is only one mile and 35 chains, but when this line is in operation, passengers from Yokohama, Kamakura



Construction in Progress

and all points on the Tokaido line, without changing train, will be able to take trams for Nikko, Sendai and Hokkaido from the Ueno station. At present, all these Tokaido passengers must leave their trains at the Tokyo station and take automobiles or the trams to the Ueno station.

The railway line on the left, in the illustration, is the government electric railway system which run around the outskirts of the city of Tokyo. This picture was taken near the Kanda station.

ordered his Manchurian ivory-carvers to make one of ivory. He was quick to grasp the idea of the switch and to understand how it worked, and he used to watch the preparation of batteries and adjustment of bells with great interest. His holiness's hobby is gardening. His summer palace grounds are laid out on the English system, and are full of flowers and turf lawns. When I bade him farewell, I told him that I would send him the best magnetic telephone on the market, his reply was that I may do so, but that he would like above all was some good flower seeds. I promised to send him some which were obtained from flowers grown in the Kashmir valley, as those would be more suitable to the Lhasa soil. The Dalai Lama talks in a low voice, and most people would think that it would never penetrate a long-distance line, but it surprised me to find that his voice penetrated often when others failed to reach. I listened-in on the line once on my return journey, and I was surprised at the rich timbre of his voice. His personal interest in his own servants was great. When I was leaving Lhasa for India, he asked me if I could take Rs. 20 for him to two Thibetan youths who were learning gardening in the residency at Gangtok, and also to deliver a message to them. He is a keen photographer and takes good photographs.

On my return to Calcutta I was sent back to Rawalpindi and then up the Tochi valley in Waziristan on the north-west frontier for a month. The difference between the two frontiers there is no mistaking, for where I could travel even at night without an escort in Thibet my work in the Tochi was restricted to the hours of 8 a.m. to 3 p.m., after which the road was closed and every one must be within barbed wire or remain out at their own risk. Even in the working hours my party had to be escorted, and we were a continual source of anxiety to the officer commanding signals. Walking to and fro amongst the Waziri travellers on the road during the day is like walking amongst tame lions.

Trade Ties that Bind

United States Has Premier Place in Japan's Foreign Commerce

By Dr. Takuma Dan,* Managing Director Mitsui Gomei Kaisha

ECONOMIC relations between the Japanese and the people of the United States which have been growing with wonderful rapidity, are bringing the two peoples on both sides of the Pacific to be united by a strong bond of sympathy and friendship. As an instance of this we may gratefully recall the fact that the American people were the first to come to our succor in the recent earthquake disaster. How the contribution of funds so liberally and spontaneously made by the sympathetic Americans helped hundreds and thousands of the destitute sufferers need hardly be recounted. While we can hardly estimate with any degree of accuracy the extent of the loss and damage caused by the earthquake and fire, there can be no doubt that the reconstruction work will take many years to come, and absorb many billions of money, but when we remember that the national savings in Japan amount annually to many hundred millions we need hardly apprehend as to the continuation of the reconstruction work on the devastated districts, and rehabilitation of industry.

Under these circumstances, the United States is bound to continue in supplying a larger part of reconstruction materials. After the bitter experience of the disastrous earthquake, Japan will naturally want iron and steel as building materials which America can abundantly supply. As a matter of fact, American and Japanese steamers are already carrying a bulk of such materials to our shores. Besides these, the United States has also been principal supplier of cotton, machinery, motor vehicles and petroleum to our country. Immediately after the earthquake, the Japanese government issued an imperial ordinance temporarily repealing the import duties on such articles as foodstuffs, clothes and building materials. The value of these imports thus exempted from taxes during the seven months from September, 1923, to March, 1924, amounted to 441 million yen, an increase of 236 million yen on the corresponding period of the preceding years. The increase is due primarily to the reconstruction work, and is largely ascribable to American goods. Apart from the reconstruction work, however, which may naturally be regarded as a temporary factor, the trade between Japan and America has been vastly increasing for the last decade, during which time the Japanese exports to the United States were tripled, and the imports therefrom were quintupled. Of late years the United States, on

their part, have made remarkable progress in their Far Eastern trade. Of all the principal countries trading with Japan the United States had stood far below Great Britain, Chinese republic and British India in respect of imports. But they have now secured an unchallengeable place as importers of merchandise into Japan, their goods comprising 25.8 per cent. of the total Japanese imports in 1923; whereas they were only 7.2 per cent. of the imports in 1893 or thirty years before. This, I think, will testify to the possibility of Japan as one of the most prosperous overseas markets of the United States. The following shows the details:

Year	Total Imports	Imports from U.S.A.
1923	Y1,982,231,000	Y551,977,000
1922	1,890,308,000	596,169,000
1921	1,614,155,000	574,401,000
1920	2,336,175,000	873,182,000
1919	2,173,460,000	766,381,000
1918	1,668,144,000	626,026,000
1917	1,035,811,000	359,708,000
1916	756,428,000	204,079,000
1915	532,450,000	102,534,000
1914	595,736,000	96,771,000

To take an example, American lumber was imported in recent years in surprisingly large quantities as follows:

1919	Y 4,020,000
1920	14,910,000
1921	25,318,000
1922	57,246,000
1923	62,492,000

(The July and August imports in Yokohama excluded, the figures being unavailable.)

The above figures indicate the greater part of the total lumber imported to Japan, namely, more than two-thirds.

The increased import was truly due to reconstruction purpose. But there is no denying the fact that American lumber has been enjoying an increasingly wider market in Japan.

To pay for the imports from the United States (i.e., for cotton, iron and steel, rails, lumber, copper, wheat, flour, petroleum, machinery, motor vehicles, etc.), Japan exports to the United States raw silk, silk goods, tea, camphor and chinaware. The Japanese exports to the United States during the past decades are as follows:

Year	Total Exports	Exports to U.S.A.
1923	Y1,447,750,000	Y605,619,000
1922	1,637,452,000	748,500,000
1921	1,252,838,000	496,284,000
1920	1,948,395,000	565,017,000
1919	2,096,873,000	828,098,000
1918	1,962,101,000	530,129,000
1917	1,603,005,000	478,537,000
1916	1,127,468,000	340,245,000
1915	708,306,000	204,141,000
1914	591,101,000	196,539,000

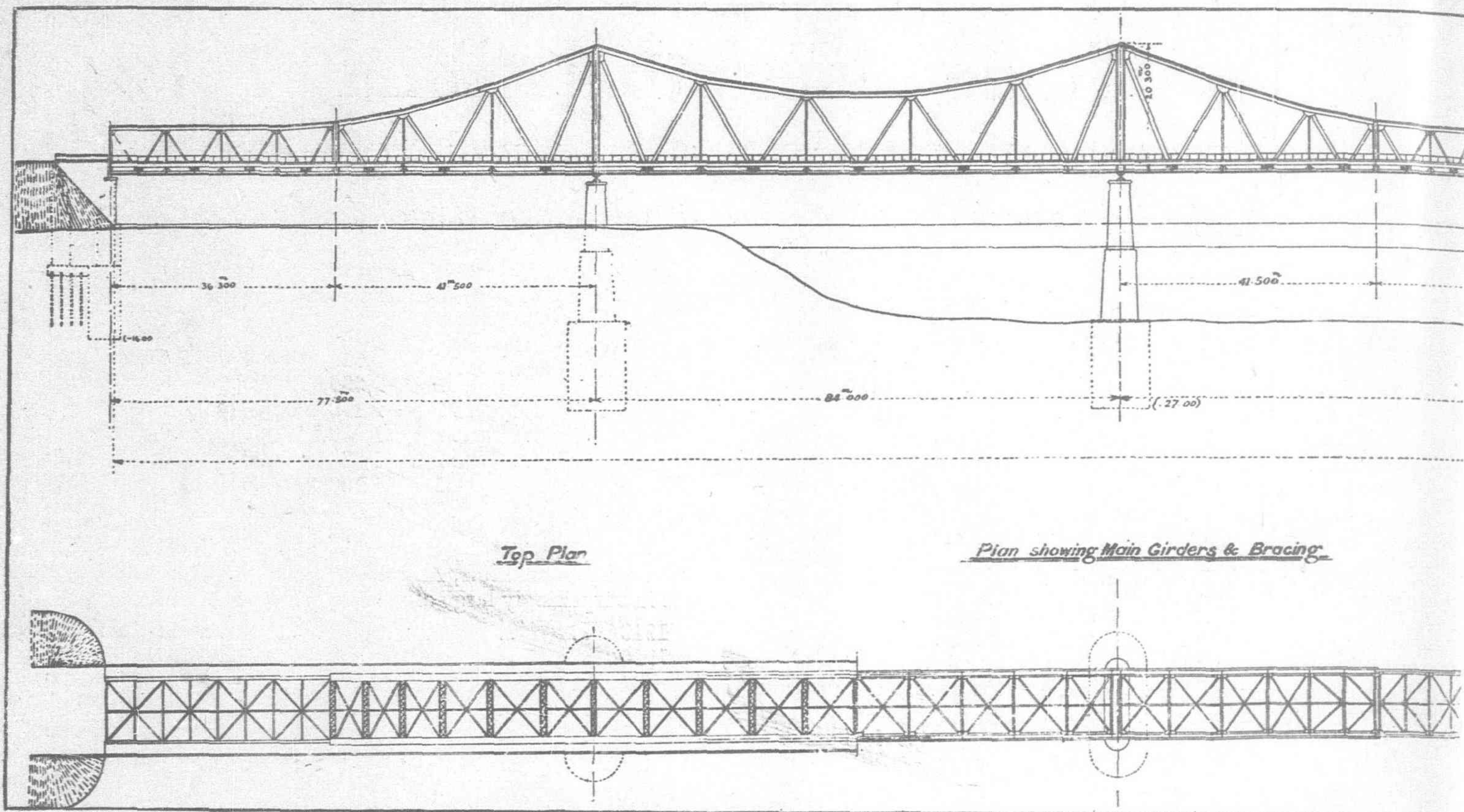
As will be seen from the above tables, the United States hold a

(Continued on page 452).



Dr. Takuma Dan

*What the Standard Oil is in the popular mind to America—a dominating all-powerful far-reaching business organization—the “Mitsui interests,” as they are commonly known, are to Japan. The head of this vast organization is Baron Mitsui, but the man to whom it owes much of its tremendous prosperity is Dr. Takuma Dan. He is the managing director of the Mitsui Gomei Kaisha, the holding company for all the varied and widespread Mitsui interests. Dr. Dan was born in 1858 and was sent as a youth to America to study mining engineering at the Boston Institute of Technology, from which he graduated with honors. He was technical officer at the Government Meteorological Observatory and later in charge of the great Miike coal mine. When this was purchased by the Mitsui company he entered the employ of that firm with which he has been associated ever since.



General View of the Rama VI Combined Road and Railway Bridge Over the Menam River at Bangkok: Under Erection

Rama VI. Bridge

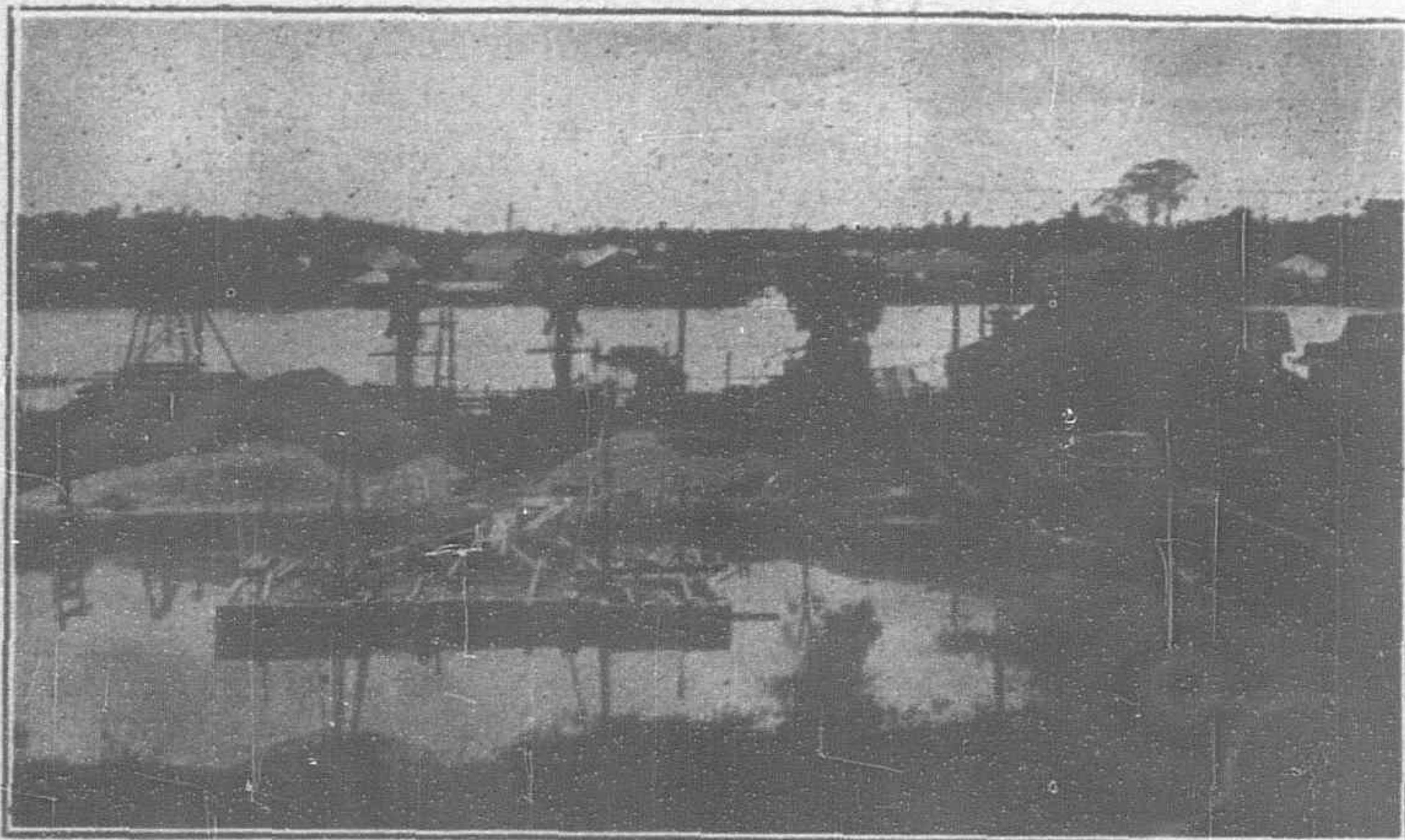
Over the Menam at Bangkok

By Luang Prakob M. Sc. (Birmingham, England)

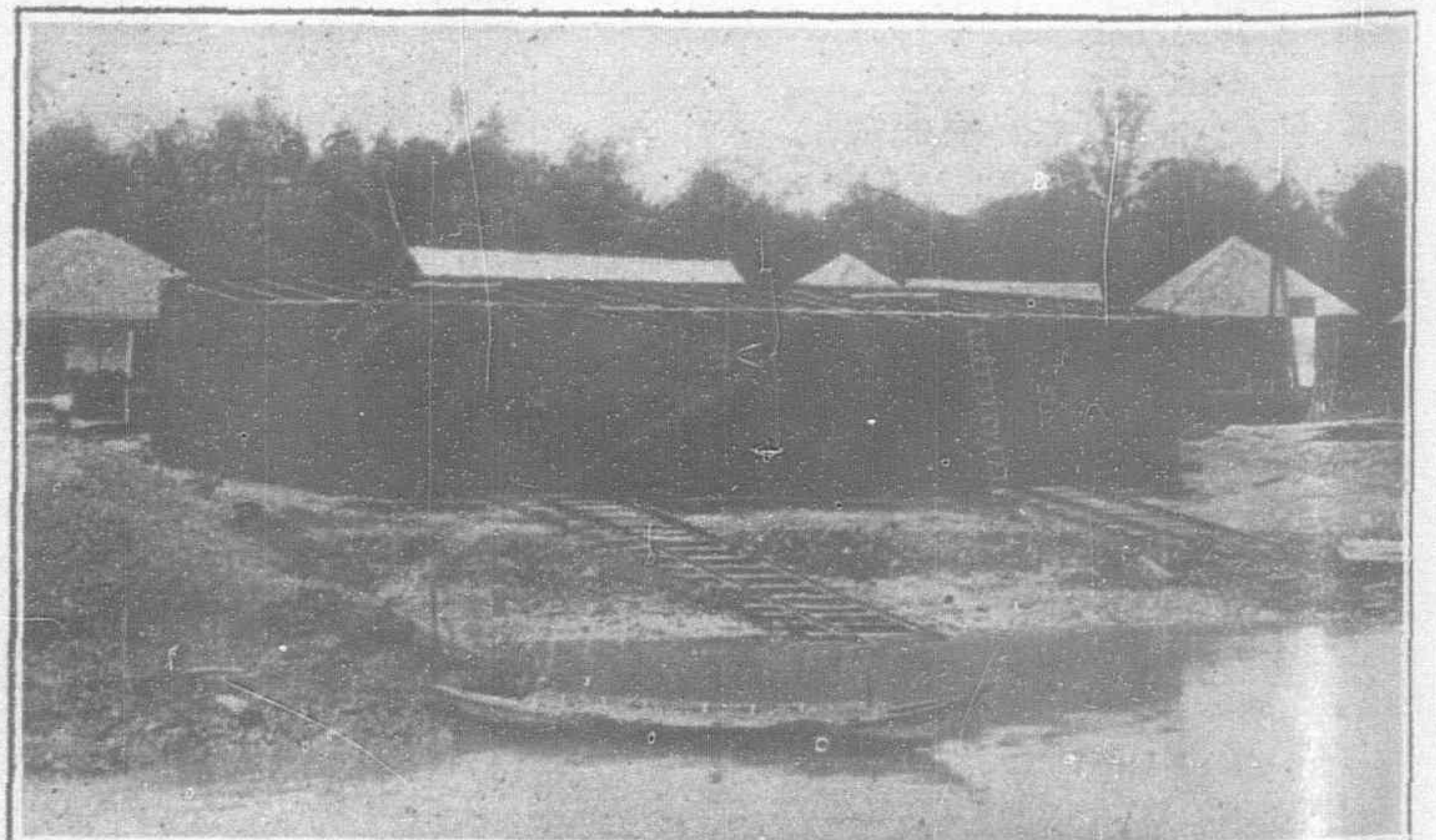
IT was decided in September, 1919 to unify the gauges of the Siam state railways by converting the standard gauge lines from Bangkok to Chiangmai, Korat and Petriew to metre gauge and further to connect up the northern and southern line systems by bridging the Menam Chow Phya. When the bridge and connecting line are completed passengers from the south come direct into Bangkok station, instead of the Bangkok Noi as at present, thus doing away with the difficulty of crossing the river by launch or sampan. Movement of freight will be much accelerated and rolling stock will be available over the whole system instead of being confined to one side or other of the river as at present. Time and money also will be saved by repairing all locomotives, carriages and wagons at the central workshop in Makasan.

The connecting link, about 13 kms. in length, branches off from the main line to the north at km. 9 just north of Bangsue station and joins the southern line at a point km. 6.336 from Bangkok Noi station. Borings made at the bridge site showed that at a depth of from -14 to -27 M. S. L. good hard clays are found, while below -27 M. S. L. there is a deep layer of sand. The river at the point of crossing is 300 metres wide.

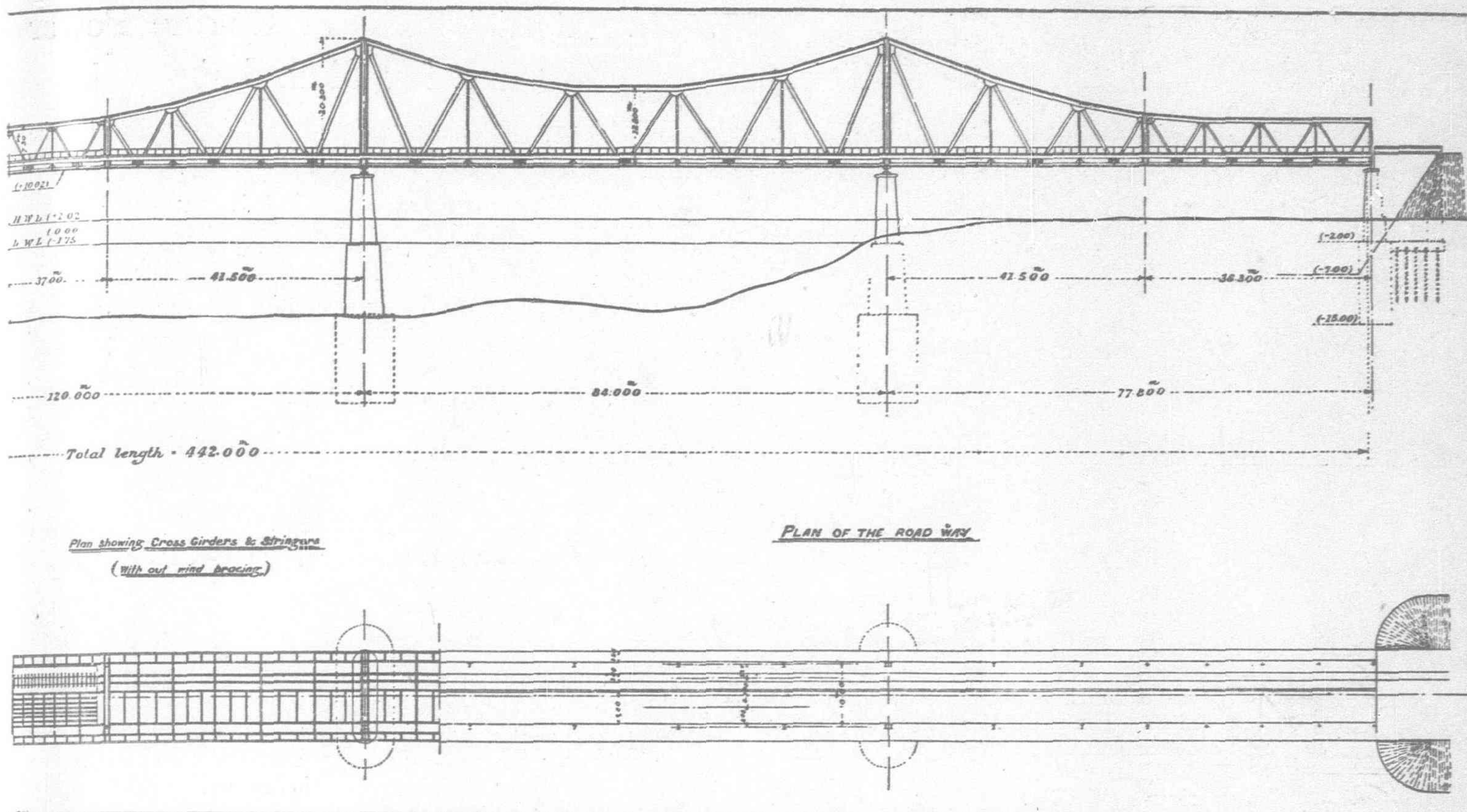
Tenders for the bridge were invited from many well-known firms of contractors and after due consideration the contract was given to Les Etablissements Daydé of Paris. By permission the bridge is called Rama VI after the King of Siam. The bridge is of the cantilever type with a total length between abutments of 442 metres. It is divided into 5 spans the central one being 120 metres while those on either side are 84 metres. The two end spans



General View of Work Showing West Abutment in the Foreground



Bottom Part of Caisson Ready to be Launched



by the Siam State Railways from Plans and Materials by Des Etablissement Dayde of Paris

are 77.8 metres. The bridge is 10 metres wide between centres of main girders and consists of a single track railway, a 5 metres roadway and footways 1.50 m. wide on either side, outside the main girders.

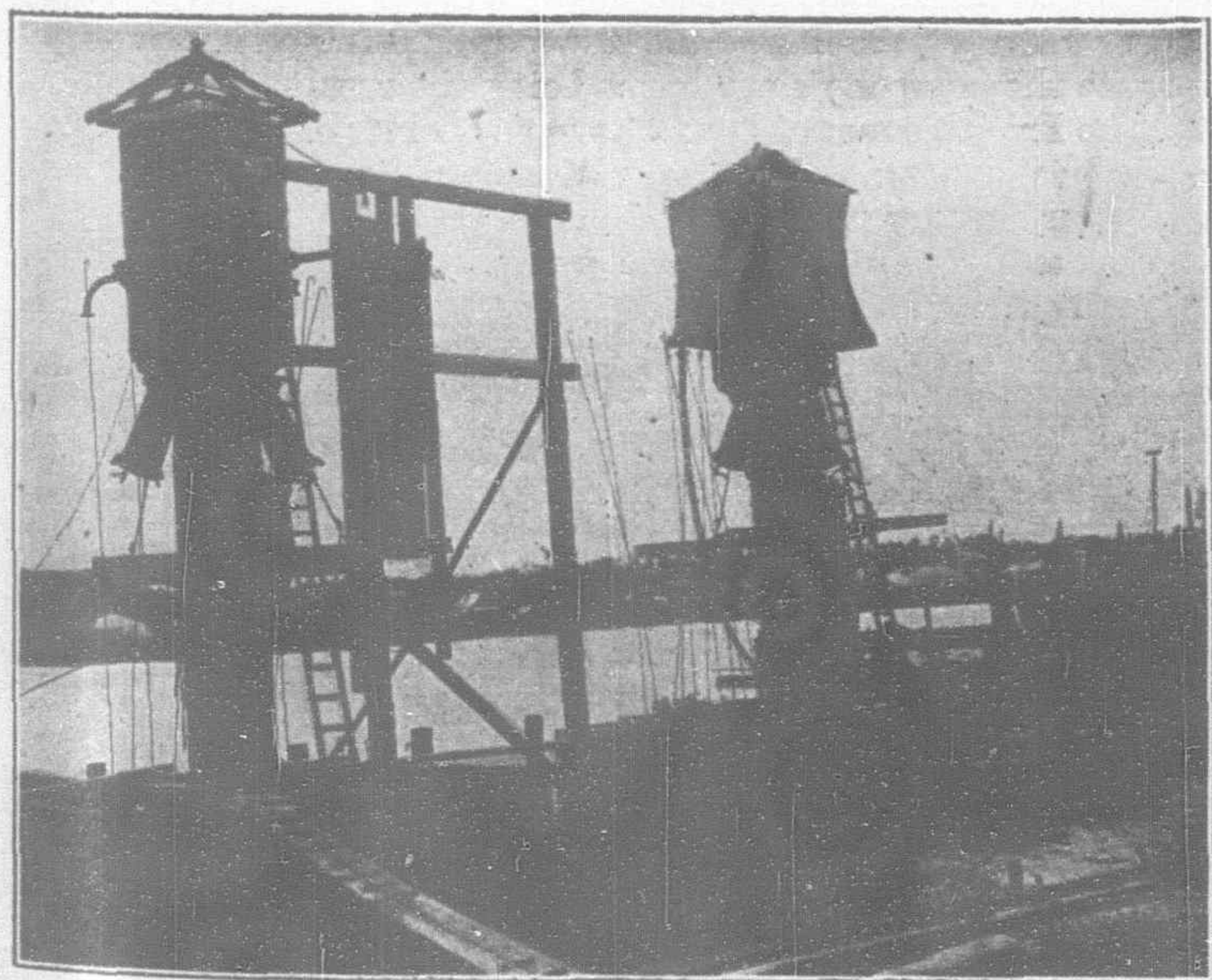
The clearance is 10 metres above mean sea level and 8 metres above maximum flood level, so that ordinary launch and cargo boat traffic can pass safely at all times. The expansion and contraction due to changes of temperature are allowed for by three sets of expansion joints on the length of the bridge. The foundations are being carried out under compressed air. The abutments are taken down to a depth of not less than -15 metres and the piers to -27 metres M.S.L. The level of the river bed is about -15 metres M. S. L.

The caissons for the abutments are 16 m. by 6 m. with rounded corners, while the pier caissons are almost twice as large and have semi-circular ends. The calculated pressure on the ground for the

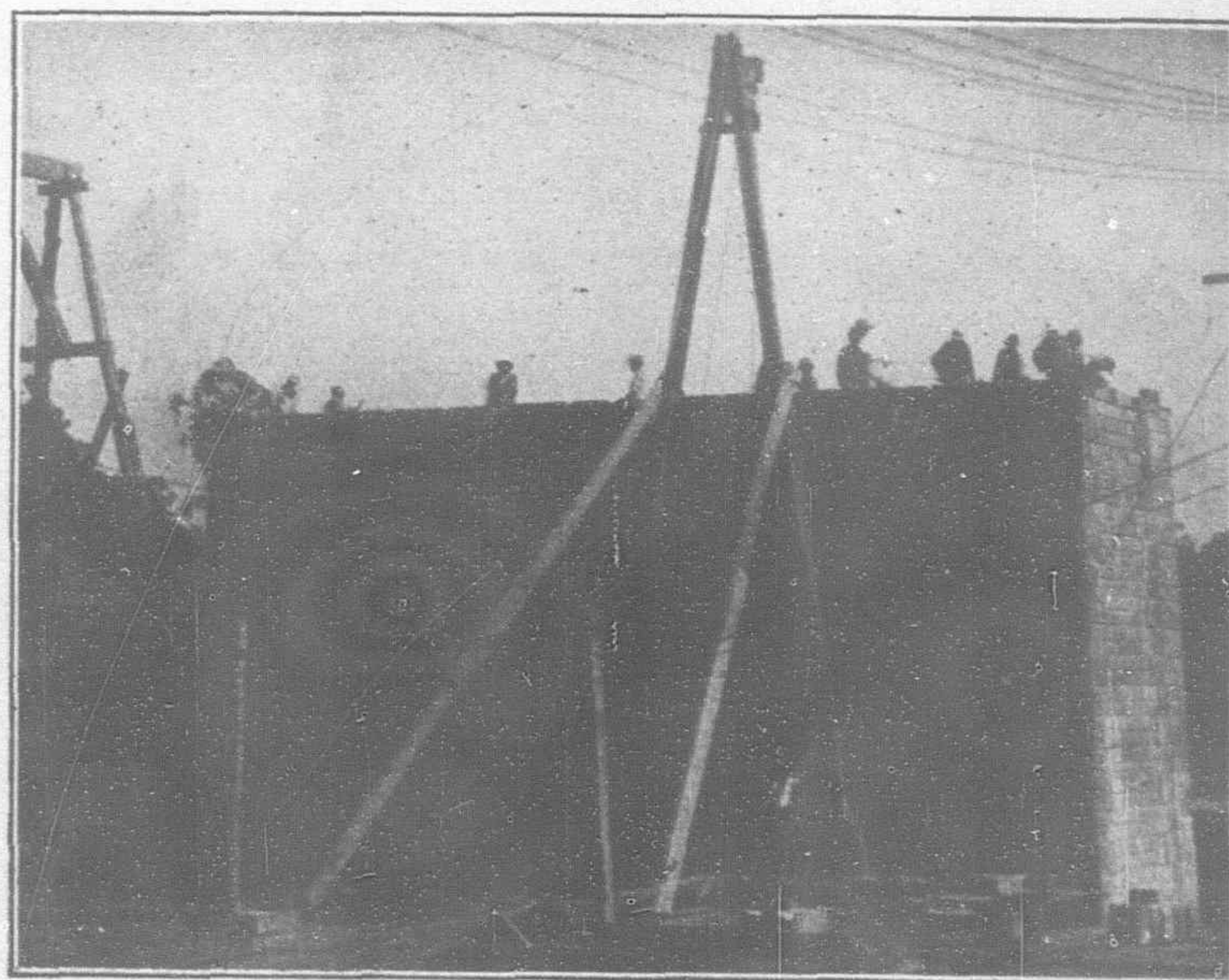
abutments (neglecting friction and buoyancy) is 4.5 kgs. per sq. cm. and for the piers 3 kgs. per sq. cm.

Each caisson has two shafts with air locks to provide for disposal of excavated materials and the entrance and exit of workmen. In the case of the east abutment and pier No. 2 the excavated material has been carried up the shafts in steel buckets, but in pier No. 5 water has been introduced into the working chamber to mix with the excavated material which is then blown out through a pipe by compressed air. This method also will be used for the river piers Nos. 3 and 4.

The West abutment has been sunk through the soft blue clay by a compressed air ejector, the caisson sinking by its own weight as the material is removed. Water is pumped in to mix with the clay. In this way the foundation has been taken down 14 metres without the use of air locks but these soon will be required as the materials at that depth becomes more solid and it is necessary to have men in the working chamber to excavate it.



Pier No. 1



Front Elevation of Abutment

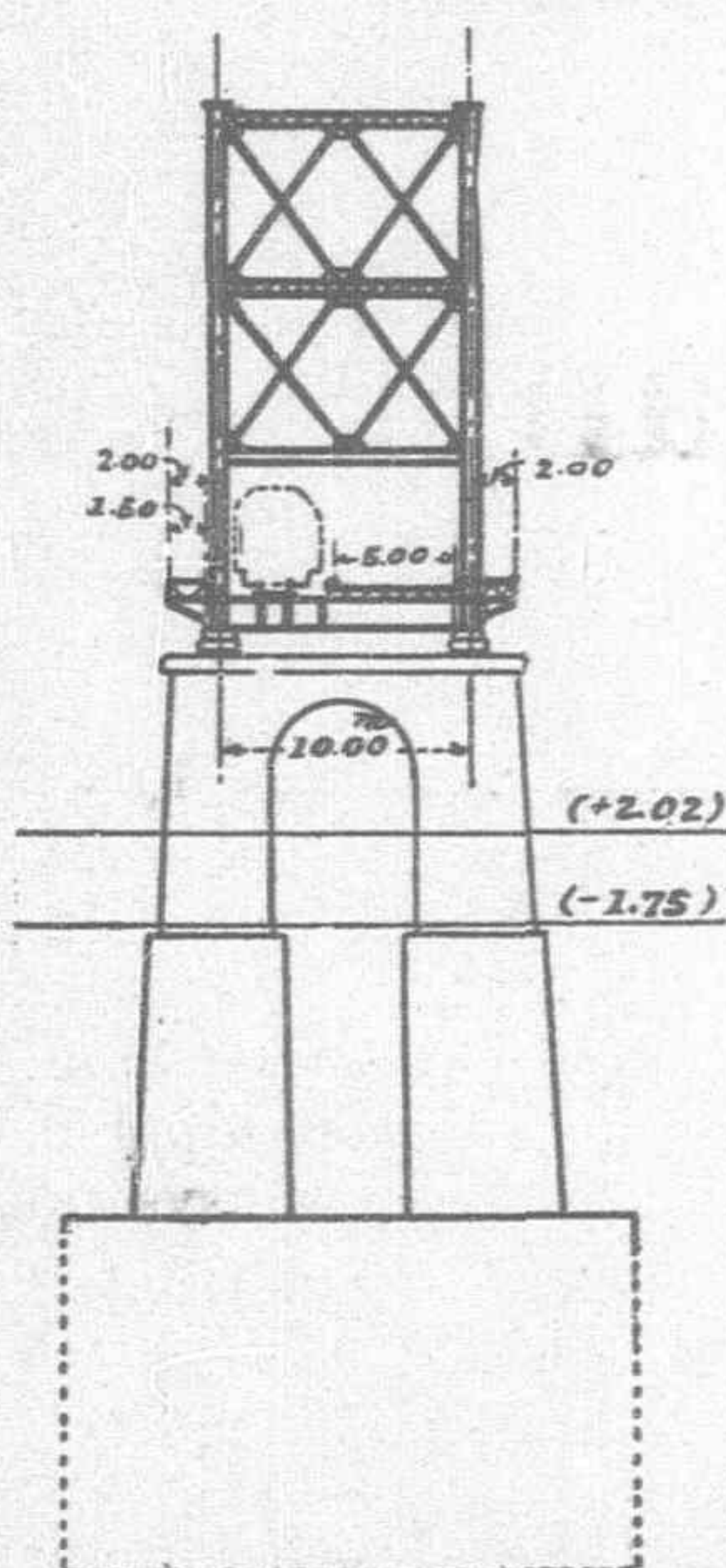


All air compressors and other machines are driven by electric power taken from the government power station at Samsen. The current is 3 phase and the voltage 3,000 on the main. As any stoppage of the compressors is a serious matter as it leads to re-

duction of pressure in the working chamber, two sets of mains were laid, to avert any possibility of a breakdown.

The east abutment now is completed, Pier No. 2 is down to required depth, Pier No. 5 has still to be sunk about 2 metres, and the west abutment is at a depth of 14 metres, ready for construction of air locks.

The working chambers for the river Piers Nos. 3 and 4 are assembled and will be floated into position between two steel barges anchored in the river. Concreting will then be begun on top of the chamber, side plates being added as the caisson sinks. When the river bed is reached the air locks will be erected on the shafts and the excavation proceeded with the material being ejected in the same way as at Pier No. 5. The piers and abutments are faced with specially cast concrete blocks to give the appearance of masonry.



General View on the East Bank

The superstructure contains 2,523 metric tons of mild steel, 63 tons of cast steel and 22 tons of forged steel. The contract sum for the bridge complete in all particulars is Tcs. 2,784,113. Work was begun in December, 1922.

World's Greatest Diesel Engine Power Plant for Shanghai

SHANGHAI will have in operation what is believed to be the greatest Diesel engine power plant in the world as soon the second of two new units now being built in Switzerland is delivered to the Compagnie Francaise de Tramways and installed in the new power-house on Avenue Dubail in the French concession. Two Diesel engines of 1,500 horse-power each already are in operation and the work of erecting the first of the two new machines is nearing completion. This latter engine is of 3,600 horse-power and a similar unit is now being built at the works of Messrs. Sulzer Brothers, Winterthur, Switzerland.

The first two engines aggregating 3,000 brake horse-power were installed in 1921 and 1922, the new station being formally opened on December 8, 1922. It had hardly started before an order was placed with Sulzer Brothers for the first of the two 3,600 horse-power units, and an order for the second soon followed. These two additions to the plant will bring it to a total capacity of 10,200 horse-power, which Mr. O. Meister, manager of the Shanghai branch of Sulzer Brothers, asserts is the largest plant of its kind in the world.

The two engines now operating are coupled to two electric generators of the Oerlikon flywheel type of which a full description was given in THE FAR EASTERN REVIEW for March. The new generators, however, will be furnished by the Creusot works of Messrs. Schneider & Company of Paris.

The "generator" is a three-phase alternator, producing current at 5,000 volts between phases, with a periodicity of 50 cycles. The normal full-load power of the generator is 3,000 k.v.a.

The alternator is of the flywheel type, rigidly fixed to the main shaft of the Diesel engine and therefore has the same speed as the latter—125 r.p.m.

The field-current is produced by a 110 volt, 60 kw. continuous current exciter acting on the rotor, fixed to the end of the alternator shaft. Alternating current is sent out at the three terminals of the stator.

The new engines are six-cylinder two-cycle machines with cylinders of 760 millimetres bore by 1,020 mm. stroke (20 by 40 inches). They are designed to run at 125 revolutions per minute. According to tests made in the factory, they are very economical in fuel consumption and when running on Borneo crude oil, they will use only 0.42 pounds of oil for each brake horse-power delivered. The scavenging air pumps for these engines are driven from the main crankshaft, while the governor controls not only the fuel feed but the injection air pressure as well as adjusting indirectly the duration of the lift of the fuel valve.

The location of the French Tramways plant practically made Diesel engines imperative owing to the difficulty of obtaining sufficient water for even the present steam plant. This lack of water for condensers put further extensions of the steam installation out of the question and as the steam plant was getting a bit old. It was, therefore, decided by the company's engineers to "build from the ground up," the handsome new power plant on Avenue Dubail opposite the company's car barns being the result.

The French concession will have a considerable excess of power for electric heating and the operation of motors, new rates having been approved by the French municipality for these two uses of current, and many applications for power current have been received by the company.

Electrically Propelled Liner for Pacific

Contracts for the construction of the largest electrically propelled sea-going passenger liner have recently been given the Cramp Shipbuilding Company by the American-Hawaiian Steamship Company, Inc. Turbine-electric drive was selected by the owner in preference to direct Diesel engine or geared turbine.

The turbine-electric propulsion equipment, consisting of two Curtis turbines with a total of 20,000 horse-power will be supplied from water-tube boilers burning oil. The turbines will drive two alternating current generators of 7,700 k.w. each, which will drive two General Electric Company, U.S.A., synchronous motors of 10,000 horse-power, direct connected to the propeller shafts.



Head Office, Exchange Room

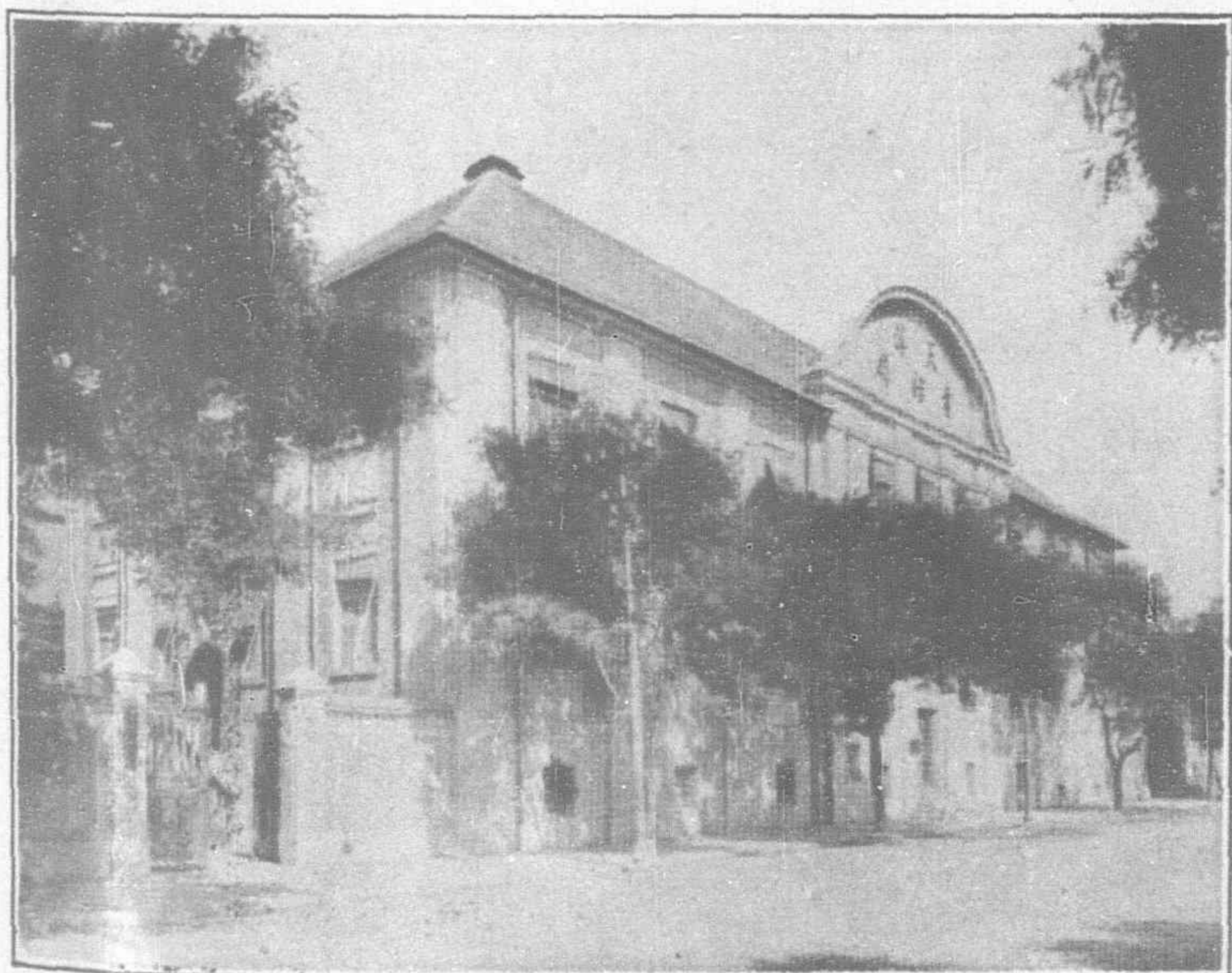
Tientsin's New Telephone Exchange

By H. A. Fleet, A.M.I.E.E.

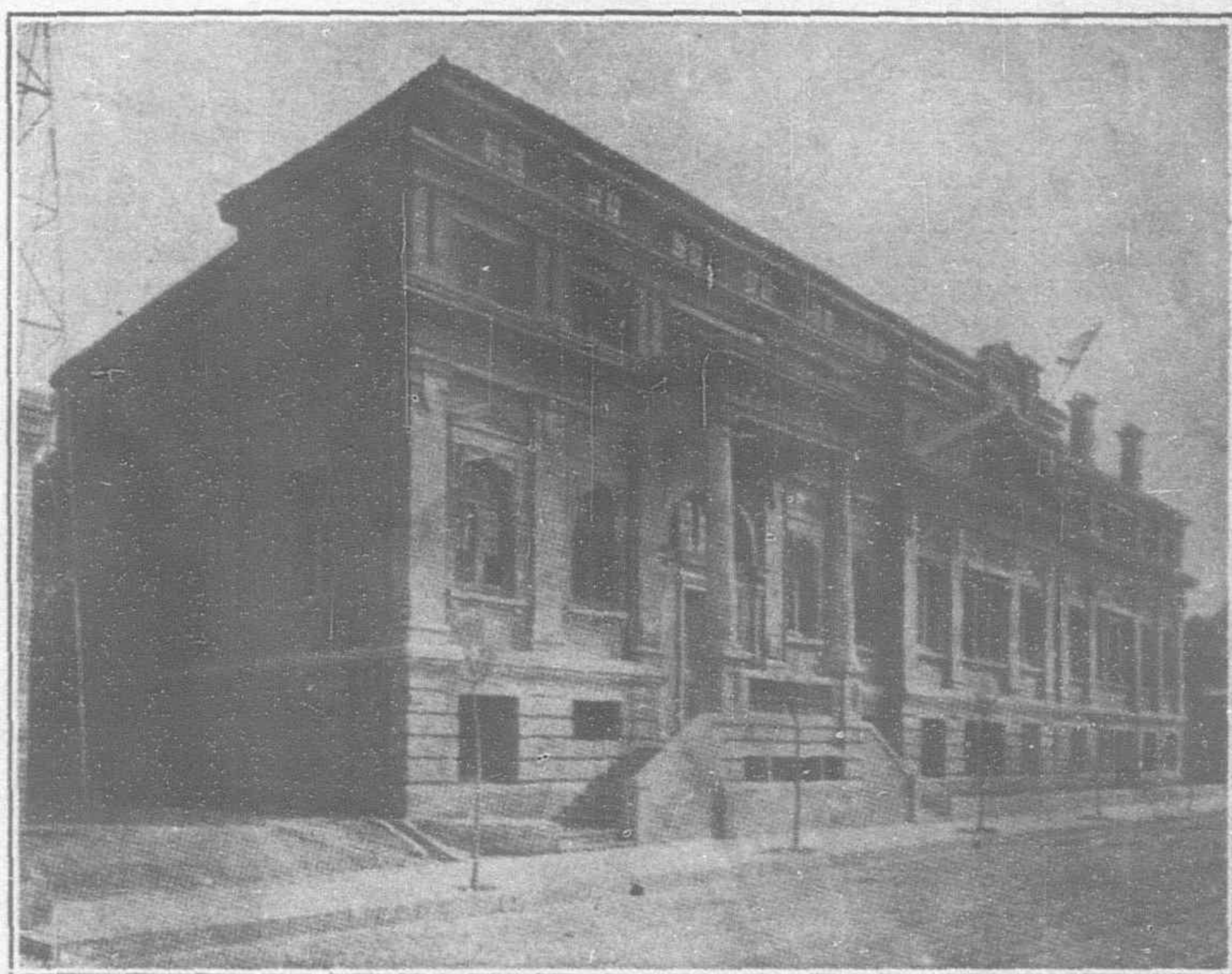
THE city of Tientsin is situated on the banks of the River Hai-ho and the Grand Canal, and may be said to be the most flourishing treaty port in North China, corresponding in importance to Shanghai in the South. It is the natural gateway to Peking, which is distant about 80 miles by rail. The native city and the foreign concessions, or settlements, are located on both sides of the river and cover a total area of over 4,000 acres. In the foreign concessions suitable wharves exist for the accommodation of steamers, for the loading and discharging of cargo, and the several municipalities, British, French, Italian, Japanese, etc., administer their own areas, the native city, which covers about 1,700 acres, being entirely under the jurisdiction of the Chinese.

The telephone system has been in the hands of the Chinese Government Telephone administration since 1913, when the franchise for the concessions, or foreign settlements, was taken over from a private company and the present head office was built and put into operation. It is equipped with Western Electric common-battery manual switch-boards, and has a capacity of 5,200 lines; the subscribers' instruments are of the western Electric and Kellogg types. The main building is about 110-ft. long and 50-ft. wide,

the battery room is situated in the basement, and two 1,600-ampere-hours capacity Chloride Electrical Storage Co.'s batteries are installed, the remainder of the basement being used for accommodating repair shops, heating apparatus, etc. On the first floor is the frame room, power room, and office accommodation. A 12-kw. motor-generator set in the power room is supplied from the French tramway power station on the 3-phase system at 380 volts. The exchange room being on the top floor is a lofty and well ventilated chamber fitted with central heating for the comfort of the operators in the winter, and equipped with numerous ceiling fans for cooling, which are very necessary in the summer. The small exchange board on the extreme left communicates with the Peking exchange, and the remainder deal with the local area. The total number of employees in this exchange is about 270, including the switch-board, clerical, and repair staff. One foreign lady supervisor, whose desk is in the centre of the exchange room, is in charge of the operators, who are all Chinese that have been trained by the administration. In the first place they are taken on three months' probation, given living quarters and food, but no wages; during this period they are taught numbers in English and short phrases, such as "number engaged," "no

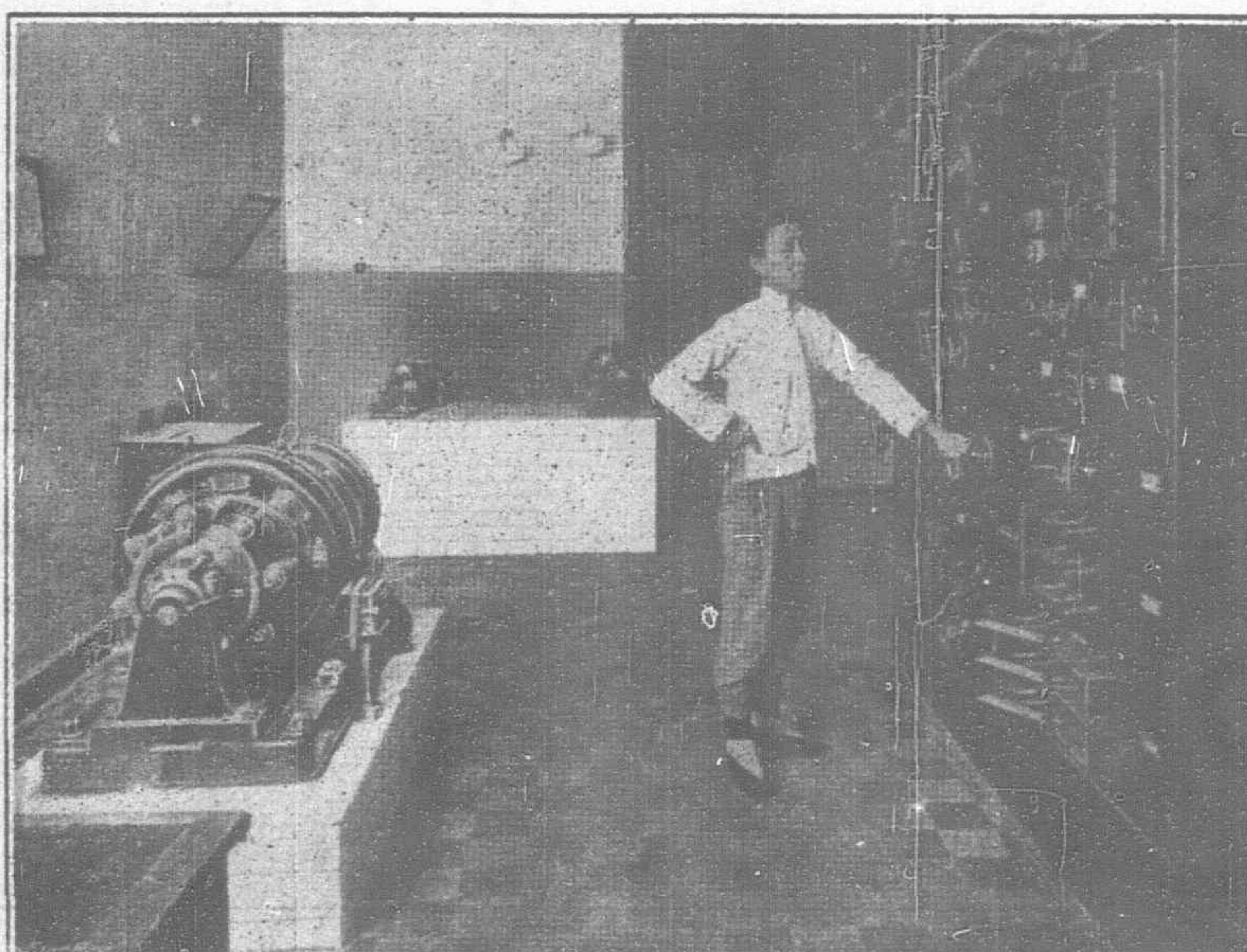


Head Office, Front View



South Office, Showing Base of Radio Tower at Extreme Left

answer," etc. At the end of this time they sit for an examination and, if the results are satisfactory, they are then accepted on the staff, begin to receive a wage of three dollars per month, and are installed as operators; as they become more proficient, at the end of another six months, the wage is increased to six dollars and there are periodical wage increases according to ability, until a maximum of fifteen dollars is reached. About 1919 the head office exchange, which is situated in the Chinese area, near the borders of the foreign concessions, had reached its limit and a new south office exchange was built, distant about two and a half miles away in the British settlement. This is a handsome brick building about 130-ft. long and 60-ft. wide. It is also equipped with Western Electric common-battery manual switch-boards for 3,000 subscribers and was put into service in 1921. At the west-end corner of the basement 12 cables containing 300 pairs of wires each leave the building, and are laid in ducts, the remaining portion of the basement being used for heating apparatus, etc., and for accommodating some of the staff, of which there are about 130 employed in this exchange. Most of the interior of the building is reinforced concrete; on the first floor are offices, together with the power and frame rooms which are combined, the door shown on the right leading into the battery room, which contains two Chloride Electrical Storage Co.'s batteries of 2,500 ampere-hours capacity each. The 12-kw. motor-generator set in the power room is supplied from the British municipal council's power station on the 3-phase system at a pressure of 380 volts. In an out-building in the compound there is a suction gas plant developing about 20 b.h.p. and belt-connected to a d.c. generator for charging the batteries in case of emergency. Adjacent to this building is a radio receiving



Head Office, Power Room



Head Office, Frame Room

station that has been recently erected, but it is not being used. Under the present system the head office serves the Chinese city, Japanese, Italian, and ex-Austrian concessions, while the south office serves the British, French, Russian and ex-German concessions. Branch offices serve Tongku and Hsien Shui Ku, while the toll lines to Peking number eight, those to Tongku three, and one serves Hsien Shui Ku. The growth of the system may be noted from the following table:—

TABLE I.

	End of 1913.	End of 1923.
Total number of subscribers	1,890	7,315
Number of conversations per day	30,880	135,690

During the past three years the increase in the number of subscribers has grown very rapidly, and it is imperative that immediate steps should be taken to make provision for early extensions. As there is only a limited amount of space available in the south office for about another 2,500 subscribers, it will be necessary to build if the manual system is to be retained and to meet the expansion of the port. Although a large number of different nationalities are served by the telephone system, in order to meet the growing needs of the port, it would be most prudent to install an automatic telephone system.

In China telephone installations are operated either by the Chinese government, the Japanese government or by companies and private concerns. For the extension and improvement of the telephone system a loan was obtained in 1918 from the Sino-Japanese Industrial Corporation on the security of all telephone property, revenue, and the right of operation; together with six radio stations and treasury notes. The amount of the loan was Yen 10,000,000, the interest being at the rate of 8 per cent. and the date of maturity three years.—*Electrical Review*.

Injecting Cement to Seal Leaky Dams

THE Swedish Diamond Rock Drilling Co., Ltd. during the last few years has developed a special method for injecting cement in drill holes under high pressure, by means of which several important results can be obtained. The cement slime is injected into the drill hole by a special apparatus, capable of producing a pressure of up to 150 kg. per square centimetre. In practice, the pressures actually used have, however, in most cases been only 30 to 40 kg. to the square centimetre.

The results of this method are that leaky rocks can be made water tight by drilling holes at suitable places and injecting a cement puddle of suitable concentration into the holes. This method finds its application at leaking dams, whereby the dam as well as contact surfaces with solid rock can be tightened. Three objects are attained: The drilling gives information of the geological nature of the rocks; the tunnel can be blasted in practically water-tight rocks, and the cementation will make the tunnel water tight so that practically no leaks will occur.

Among undertakings of this kind contracted for by the Swedish

Diamond Rock Drilling Co. may be mentioned: At Kraftwerk Waggital in Switzerland, the second largest water power station in Europe, where the gigantic dam is now being tightened by this method at its contacts with the rock. The work comprises more than 4,000 metres of drilling.

In the construction of tunnels under water, for instance in the projected tunnels under the Shimonoseki Strait and under the English Channel, it is of paramount importance that there are no large fissures in the rock. They even might make such tunnels possible of construction. But by means of the method described above, cement can be injected through drill holes in the rock and make it so water tight that hardly pumping from the tunnel either during the construction or afterwards need be done. The practical importance of this is obvious.

The Swedish Diamond Rock Drilling Company who have invented special apparatus for the purpose undertake to carry out any work of this kind. They are represented in the Far East by Messrs. Gadelius & Co., Ltd., of Tokyo, Kobe and Dairen.

The New Shisakajima Submarine Cable

By K. Kawakami and K. Shimizu, Engineers, Sumitomo Electric Wire and Cable Works, Ltd.

IN the autumn of 1922, a submarine power cable thirteen miles in length was laid between the town of Niihama and Shisaka island. This cable is one of the longest of its type that has yet been installed and it is interesting to note that it is entirely of Japanese design and manufacture and was installed by Japanese engineers.

The Shisakajima, or Shisaka island, is located in the Inland Sea, famous for its beautiful scenery, midway between the coast town of Niihama on Shikoku and the coast city of Onomichi on the mainland of Japan. Prior to its lease by the Sumitomo Goshi-Kaisha and the erection there of the company's copper smelter and refinery, Shisakajima was used only as a loading place for fishing boats.

The Sumitomo Goshi-Kaisha has owned from olden times a copper mining concession in the Besshi, some miles inland from Niihama; the ore from this mine being transported to Shisakajima for smelting and refining. In this smelting and refining process, approximately, 1,000 k.w. of electric power is required and prior to the installation of the cable this power was generated on the island by the use of coal. As the hydro-electric development at the Besshi mine provided a surplus of power, which could be generated at a much lower cost than at the coal-burning plant at the smelter, a study was undertaken of the possibility of transmitting this hydro-electric power from the Besshi to Shisakajima.

The questions which confronted the Sumitomo people were, whether power could be transmitted through a submarine cable of this length with full assurance as to continuity of service; if a suitable cable could be manufactured and installed which would have a satisfactory working efficiency; and whether with the depth of water to be encountered—maximum 170 feet—the pressure would be sufficient in the event of puncture for the water to seriously damage a considerable section. After long consideration, it was decided to go ahead with the work and a contract for the cable was placed with the Sumitomo Electric Wire & Cable Works, Ltd., of Osaka, in April, 1922. Manufacture was completed in August, installation begun in October and the final test completed on November 29, 1922. The cable has been in service since this date and has given complete satisfaction.

Power is generated at the Hadeba hydro-electric station at 3,450 volts, 30 cycles. The pressure is then stepped up to 18,165 volts and transmitted by an aerial cable—3 phase, 3 wire system—to the Niihama station, a distance of 6.5 miles; at which point the pressure is reduced to 11,000 volts and transmitted by three aerial

cables of No. 0 B&S gauge to the Isoura switch station, located near the shore of Shikoku island. This switch station serves to connect the aerial and submarine cables, a similar arrangement being adopted at the landing on Shisaka island whence power is carried over aerial wires to the plant, the pressure being reduced to 3,300 volts, at which voltage the power is used for service.

The cable is of the 3-core paper insulated, lead covered and galvanized iron wire armored type; a cross-sectional view being shown in Fig. 1. The conductor is composed of annealed copper wires stranded into sector form, insulated with manila paper, three cores laid up circular with wormings of jute yarn and further insulated with manila paper. The core is further wrapped with thin strips of copper laid side by side with proper clearance between and further insulated with manila paper. The core is dried under vacuum, impregnated, lead covered, jute served and armored with galvanized iron wires and finally served overall with jute yarn.

The peculiar feature of the construction of the cable is that under the lead sheath there are four strips of copper wound spirally around the cable core. These copper strips, in addition to serving as a protective device for the cable, are utilized to form two telephone circuits; an application which in so far as we know has not previously been made. The ordinary method of inserting telephone circuits in a power cable is to lay up the insulated pairs with the three insulated power conductors, which makes the diameter of the cable unduly large, particularly so with the sector shaped conductors. Furthermore, the insulation on the telephone conductors must be comparatively heavy so as to avoid breakdown of the insulation, and this also makes the diameter of the cable greater. The present type of

cable is far more economical, easier to handle and is less liable to damage during transportation and laying.

In the case of a paper insulated submarine power cable, the use of protective copper strips is almost imperative. If the cable is damaged, the seawater will penetrate into the insulation very quickly and it will take a longer time to repair the cable than in the case of the ordinary underground cable. Cable faults, especially a fault between the lead sheath and insulation, must be detected before the cable breaks down to the water reaches the conductors. This can be done with the present scheme; the copper strips also being used to advantage for purposes of detecting any fault in lead sheath or joints during the process of laying the cable. Fig. 2 shows the method of connection of the copper tapes to the signalling and testing equipment at the two switch stations. The action of the copper tapes as a protective device is such that, when a fault occurs in the cable, the copper tape is earthed at that point and the circuit which the copper forms is closed, causing the current to flow through "B" and "L" and give an alarm.

The cable was manufactured in continuous lengths of 3,000

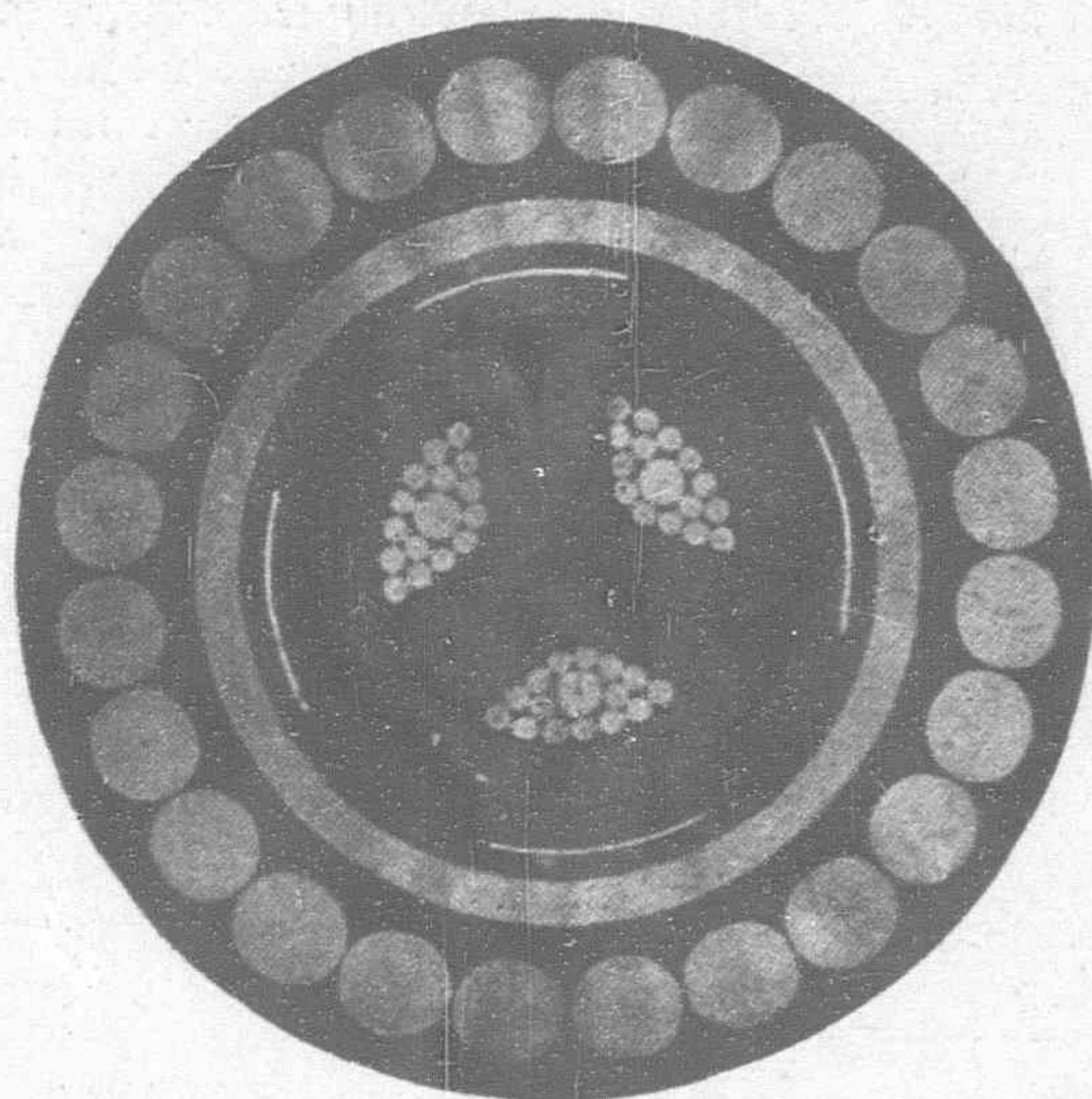


Fig. 1

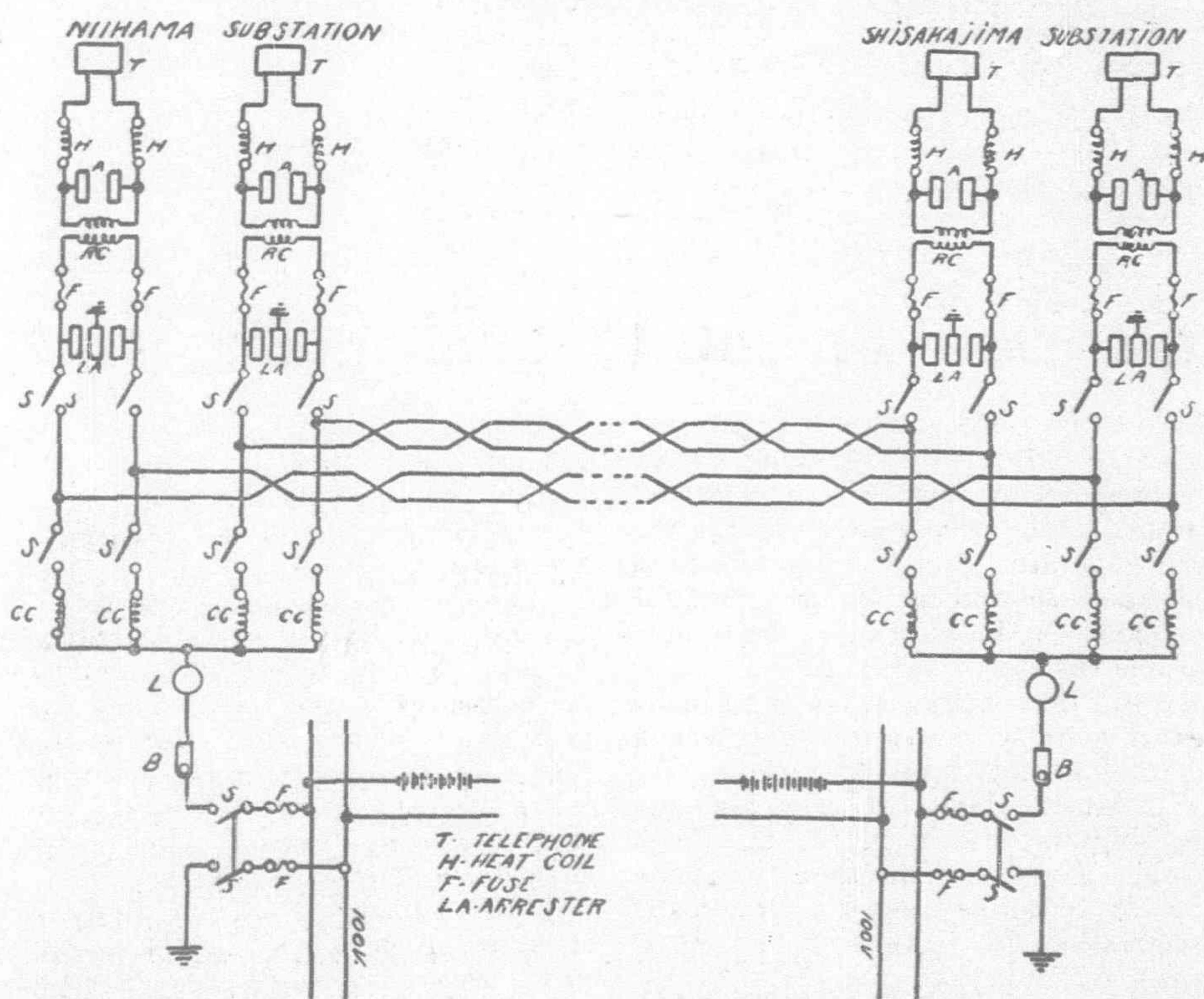


Figure 2

feet at the factory and all of the pieces joined together into two lots before shipment, one section measuring 33,000 feet long and the other 36,000 feet. One section was laid from the beach of Niihama in the direction of Shisakajima and the other from Shisakajima towards Niihama, the joining of these two sections being made at the middle of the sea. In joining, the copper conductors from each end were first connected, then each conductor was lapped with impregnated paper, all were enclosed in a lead sleeve and the joint was filled with insulating compound. Jute was placed over the sleeve and the wire armor was lapped overall to make the joints mechanically strong.

The following physical and electrical properties of the cable as detailed in *Electrical Communication* are of interest:—

Sectional area of each conductor.....	100,000 circ. mils.
Construction of conductor.....	19/.0725"
Thickness of insulation between conductors.....	.350"
Thickness of lead sheath.....	.130"
Thickness of jute bedding.....	.100"
Number and diameter of galvanized iron wires.....	24 x .300"
Thickness of jute serving.....	.100"
Size of copper tape.....	$\frac{1}{2}$ " x .013"
Approximate overall diameter.....	3.0"
Weight per 1,000 feet.....	6.3 tons
Normal working voltage.....	11,000 volts
(Neutral point of system earthed)	
Factory test each 3,000-ft. length	
Between conductors.....	33,000 volts a.c.—15 minutes
Between conductors and lead sheath,	
28,000 volts a.c.—15 minutes	
Tests after installation	
Between conductors.....	16,500 volts a.c.—10 minutes
Between conductors and lead sheath,	
13,500 volts a.c.—10 minutes	
Measurements at 72° F.	
Insulation resistance, between one core and other	
two cores connected to sheath	6.9 megohms
Copper tapes and lead sheath	1.8 megohms
Capacity, between the core and other two cores	
connected to sheath	4.4 mfd.
Between three cores and sheath	7.9 mfd.
Between tapes and sheath	11.0 mfd.
Between two copper tapes	5.5 mfd.
Copper resistance main conductor	7.65 ohms

Trade Ties that Bind

(Continued from page 445)

premier place in the foreign trade of Japan, their portion comprising about 40 per cent. of the total exports and nearly 30 per cent. of the total imports and far surpassing the other countries, while she comes next to Great Britain, Canada, Germany and France as buyers of their goods.

The future of the trade between America and Japan undoubtedly depends upon the prosperity and friendly relations of the two countries. Fortunately for Japan, the effects of the recent earthquake disaster upon her industrial development have not been so ruinous as was imagined.

Anybody who knows the history of the growth of recent relations between the two countries will agree that the traditional amity has inspired the people of both countries for mutual comprehension and confidence which contributed to the steady and rapid development of trade relations between the United States and Japan.

It is my firm conviction that every man of both countries, one and all, should feel it his own bounden duty to uphold and strengthen the traditional friendship which has been such a potent factor in the

past, and which should be made the foundation of a healthy social and business relationship between the two countries, guaranteeing peace on the Pacific and creating a new and brighter dawn of civilization.

A Railway to Szechuan

OCCASIONALLY, although the possibility of such a thing was once scoffingly questioned, a good thing does come out of Nazareth. Marshal Wu Pei-fu is urging the government to proceed with the construction of a railway to Szechuan. Whoever urges this proposal on the government ought to receive the strongest backing from every quarter. There are two principal projects for a line into Szechuan, and it really does not matter much which of the two lines is first built so long as work is actually begun. The senior project is that provided for in the Hukwang loan, on which a good deal of preliminary work has been done under American auspices. This line is to break off from the Peking-Hankow line a little way north of Hankow. The second project is for a line linking up the Lung-Hai line with Szechuan, for which a good deal of preliminary work has been done by the engineers of the Siemens-Carey syndicate. Both projects involve considerable engineering difficulties, and the expenditure of very large sums of money, mostly, it may be said, for work and materials and land, in China itself, so that an immediate economic benefit would accrue to the people of China from the prosecution of the work, quite apart from the permanent addition to the economic resources of the country when the projects shall have been completed. Obviously, here is an immediate and tangible benefit to be obtained, and no opportunity should be missed of obtaining it. Both projects are American, or at least are allocated to American interests, one of which is outside the scope of the original consortium and has little or nothing to gain by inclusion in the consortium's orbit.

It has been quite obvious for a long time that the consortium is as dead as Queen Anne or Marly, and is only awaiting burial, decent or unceremonious, as occasion may serve. It is possible that a decision to go on with either of these two projects would pave the way for an arrangement whereby urgent railway requirements might be allocated to the different members of the consortium independently of their consortium affiliations and understandings, and thus a new era in railway construction in this country would be inaugurated. Two things stand in the way of such a revival of railway construction. First, the existence of ante-bellum contracts which have gone no further than the documentary stage, and cannot be held valid now that the money markets of the world have undergone a revolution that makes former figures of capitalization, former rates of interest, and indeed every aspect of large-scale finance, lose all their significance. In the second place, parliament will stand in the way of any proceedings that would strengthen the position of the consortium.

It is, as we are constantly repeating, necessary to recognize the facts, which are as we have stated. Then why not act in accordance with the facts. A cabinet committee, consisting of the minister of communications, Admiral Wu Yu-lin, the minister of agriculture and commerce, Dr. W. W. Yen, and the minister of foreign affairs, Dr. Wellington Koo, should be appointed to draft a trunk railways bill in conjunction with a parliamentary Committee, and in conference with foreign financial interests, on the same lines as are frequently adopted in the chaotic countries of Europe as a means towards financial rehabilitation. This committee, in constant touch with the representatives of foreign finance, might draft a scheme as a substitute for the consortium's cast-iron and unworkable model. The consortium interests have frequently intimated that if there is a real alternative they are prepared to consider it. It would be the duty of the proposed committee to show that there is an alternative, and a real alternative, that would be attractive to the foreign investor and would not involve the monopolistic, or apparently monopolistic, features of the consortium plan. We do not for a moment doubt that capital is available or China if China can show that she really means business on practical lines such as would harmonize the various elements that have hitherto been the source of discord and jarring.—*Far Eastern Times*.



Aeroplane View of Villages in the Inundated District

Chinese Conservancy Work on the Yung Ting Ho

A Plea for Conservancy that Conserves

By Lawrence Impey

PUBLIC attention has recently been drawn to conservancy work in North China by the threat occasioned to the city of Tientsin through the exceptionally heavy floods of the 1924 rainy season, which not only endangered Tientsin itself but also caused many deaths and heavy financial loss not only to the farmers, but to the community at large by reason of the hindrance to or prevention of railway traffic on the various lines in the neighborhood of that city and Peking. The damage and obstruction on the Peking-Suiyuan railway, the temporary cessation of through traffic on the Peking-Hankow railway are instances of this which will be fresh in the minds of all, but for some reason or other very little seems to have been published as to the actual conditions governing and in part responsible for these disastrous floods. The Chihli river commission is of course well known to the public by name, though its functions are probably not so clearly held in mind, but few know much about the Yung Ting conservancy board or have more than a faint idea of the course of that river though it is, in its flood season, the chief menace to the safety of both Peking and Tientsin.

Two years ago the writer had occasion to visit this river and observe the functioning of its conservancy board, acting as in-

specting engineer on behalf of the China international famine relief commission, and it has fallen to his lot to repeat the visit this year immediately after the subsidence of maximum flood, so that he has been enabled to obtain some measure of comparison as to the conditions during that period and to estimate in a rough way what the conservancy board actually has accomplished. It must first be pointed out that although one tributary of the Yung Ting River actually rises back in the hills in distant Shansi and the other to the west of Kalgan, no attempt has been made to survey these or prepare any extensive scheme for afforestation of the same by the conservancy authorities referred to. The course of the river in reality first enters the region of practical politics (in more senses than one) when it leaves the western hills in the neighborhood of Mentoukou and takes a turn towards the south on its course to the sea below Tientsin.

The first work that the observer will notice after leaving Mentoukou and proceeding along the river dykes is the embankment work which was carried out in the summer of 1923 by the soldiers of General Feng Yu-hsiang, and which was chiefly financed by the China international famine relief commission. Reference to the accompanying map will show that at the site of the



Aeroplane Reconnaissance of Flooded Area—The Pei Ho Flood on Left; The Hsi Ho menacing the Tientsin-Pukow Railway—On Right is Shown a Junk Navigating the Flood near Tientsin

work marked "A" the river turns on a bend to the south-east, and it was here that a very serious threat to the dyke occurred in 1922-1923, endangering the safety of Peking itself. During the dry months of April-June of 1923 a temporary dam was thrown across the channel and the course of the water diverted, thus permitting the construction of a solid concrete wall some thirty feet in height and extending more than half a mile along the face of the old embankment.

The work was successfully put through and is an interesting example of the uses to which the superfluous military in China might

be put, for the energy of General Feng Yu-hsiang was able to accomplish more of a constructive nature here in the space of a few months than all the rest of the militarists can show to their credit in an equal number of years. However this may be, the work when done was turned over to the Chinese conservancy board which controls the Yung Ting Ho, or rather shall we say seeks to control it, for the river has only recently set the board at defiance and broken its banks in three places. The writer has perhaps somewhat stressed the word Chinese in connection with this conservancy work, but it has been done with the intention of emphasizing the distinction and pointing out that this is a purely Chinese concern, and has no foreign advisors, engineers, or members as is the case in many other similar organizations in this country. Therefore it may be regarded in the nature of a

test as to the degree of preparedness or otherwise for innovations and possible improvements in methods of conservancy on the part of the Chinese officialdom and people.

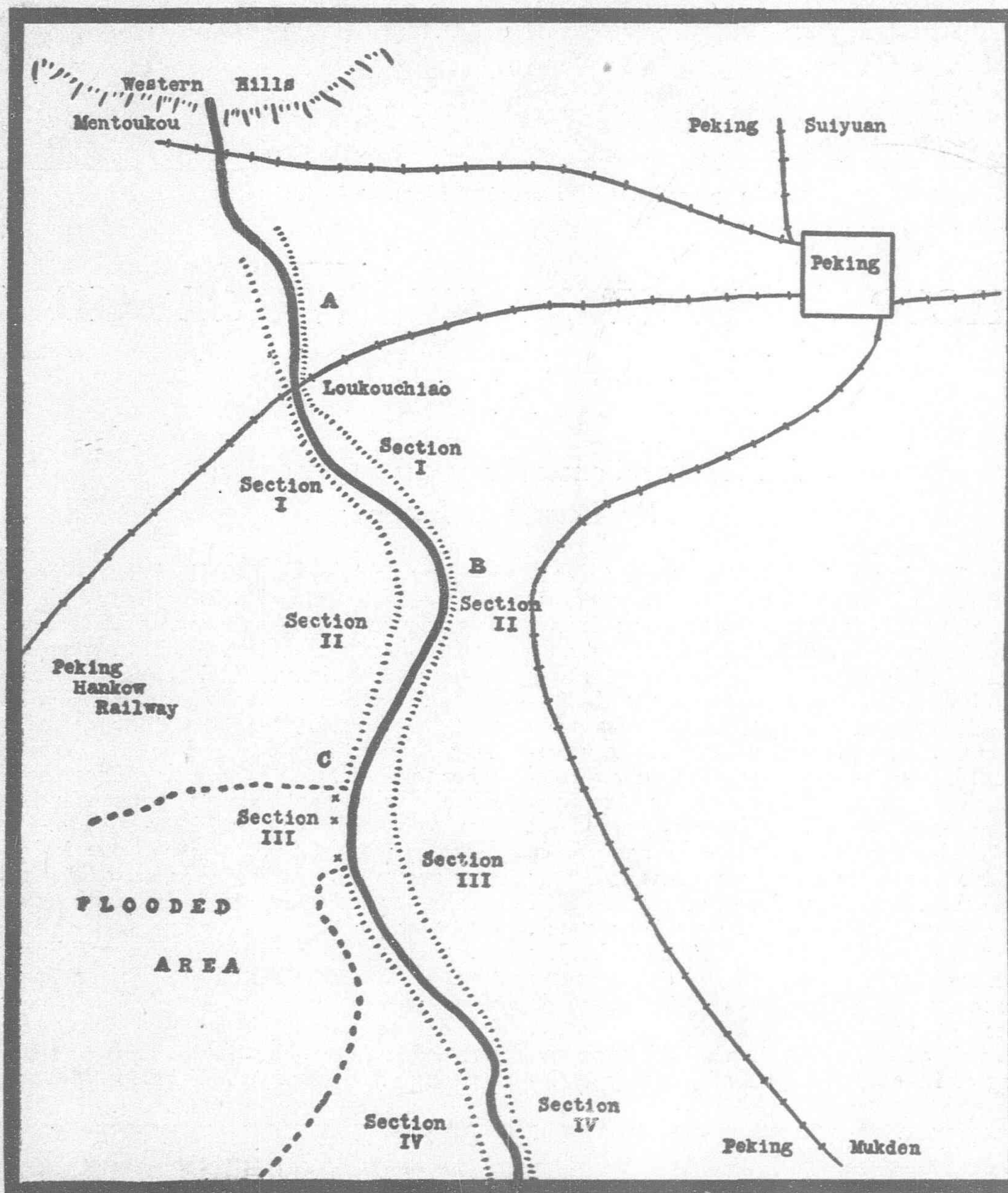
The organization which at present handles the problem of the Yung Ting is built up as follows. At the head of the board is Mr. Wang Fu-yen, and he has the technical advice and assistance of Mr. Sung, a graduate of the Tongshan College, as conservancy engineer. The head office is at Lukouchiao close to the famous Marco Polo bridge, and this is linked up with all the divisional offices by means of field telephones. The area is composed of four divisions, known as the Northern Upper, the Southern Upper, the Northern Lower and the Southern Lower, these being sub-divided into five sections each. Each of the divisions has an engineer in charge, while the sections have a staff composed of an engineer, an assistant, and two inspectors. As the sections only measure slightly

over twenty *li* apiece this might seem to be over-staffing, but on the other hand it must be remembered that, as far as the writer could ascertain, none of these engineers is such except in name. They have had no technical training and carry out their duties mainly through an abiding faith in the goodness of Providence. A permanent laboring staff works under these supervisors, some fifty workmen to a section, their numbers being added to as required when floods threaten the dykes.

Turning to a consideration of the river itself the first point which strikes the observer is the great amount of sediment held in

its water during the flood season, though at all times of the year the current is so muddy that the bed remains invisible whatever the depth may happen to be. This sedimentation is partly due to the mountainous origin of the Yung Ting and to the fact that the watershed has been absolutely denuded of trees, this combination of circumstances forcing a very rapid rise and fall in the level during the rainy season. The solid matter thus held in suspension in the current is very sandy, so much so that the writer is of the opinion that water gates for irrigation purposes might prove a doubtful blessing to the farmers, although delivery would be an easy matter, the bed of the river inside the dykes being at a considerably higher level than the surrounding country. This fact has been amply proved during the past month or two, for the breaks in the south bank dyke have allowed the

YUNG TING CONSERVANCY NORTHERN SECTION

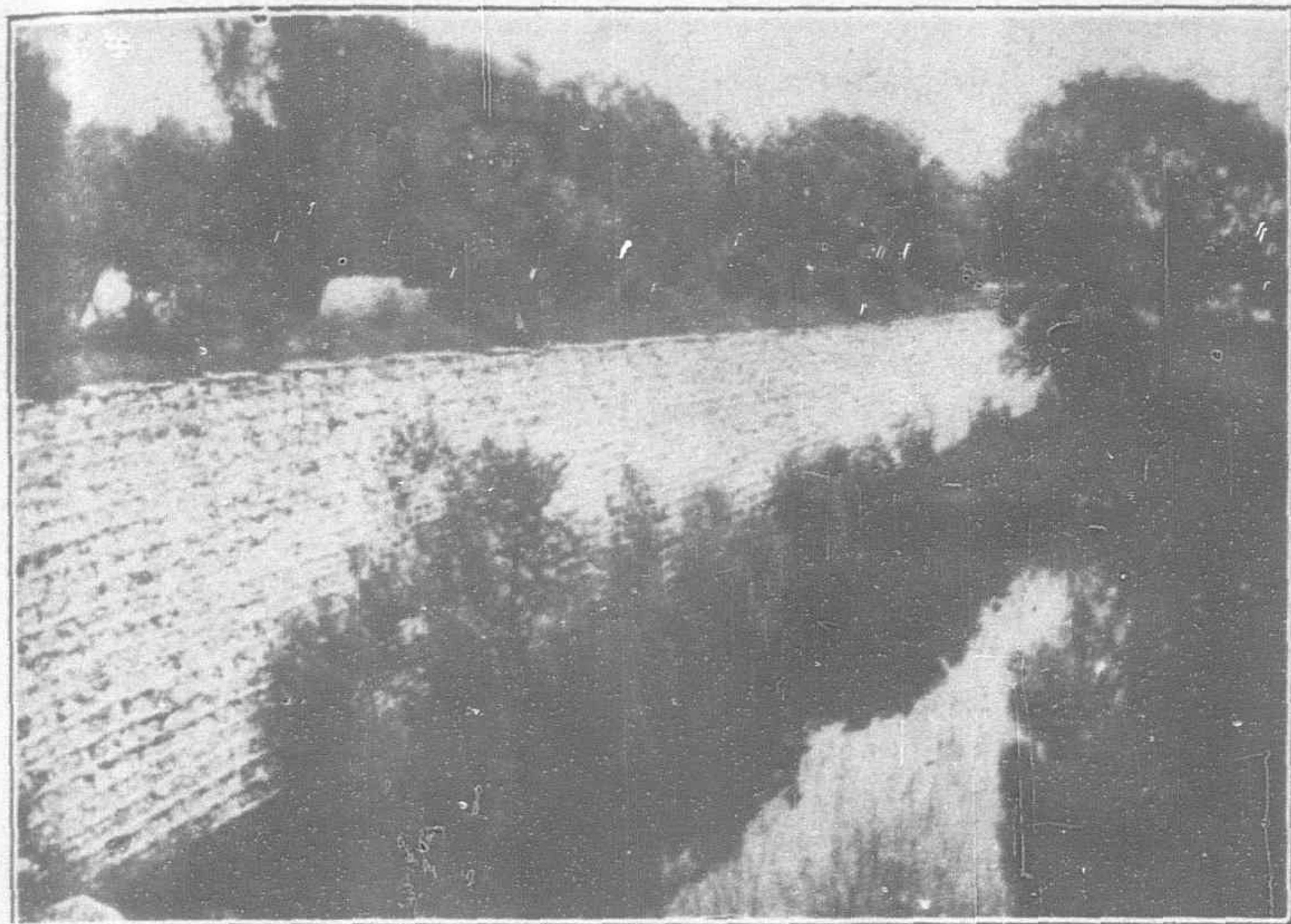


Yung Ting to flow southward nearly to Paotingfu are finding a channel back towards Tientsin, absolutely covering the fields with a deposit of sandy mud.

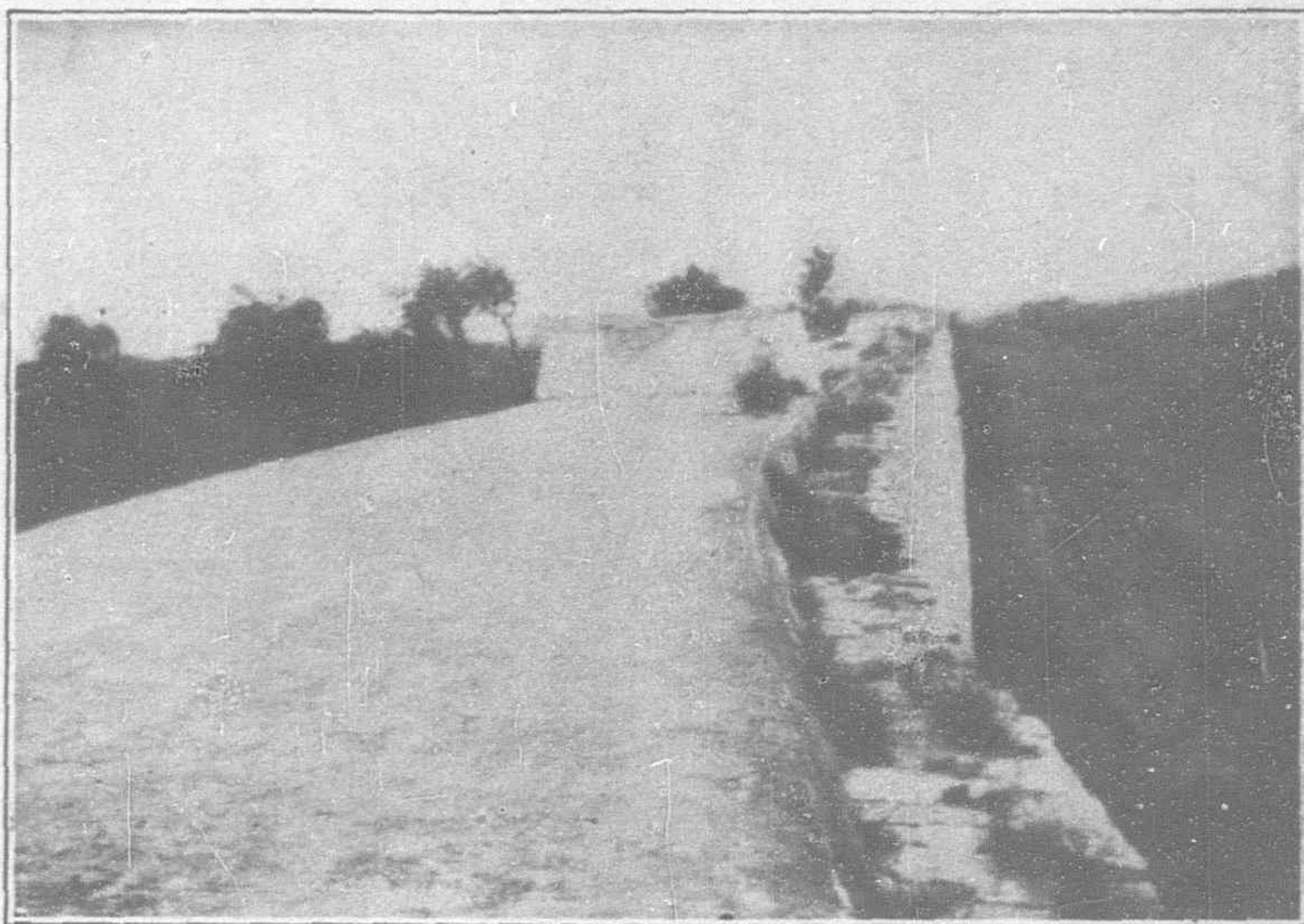
The dykes vary in height from ten to twenty feet and are sandy in their nature, as little good soil is available, while the width of the channel thus traversed by the river varies from half a mile to a mile and a half. It should be noted that quite a little masonry embankment work has been placed above the Marco Polo bridge on the northern bank of the river, and the same may be said in regard to the first twenty *li* to the south of Lukouchiao, this protection work being abandoned after that point on account of the expense incurred in transporting rock from Mentoukou or elsewhere, the river not being navigable at most seasons of the year, while cartage is impracticable. This necessitates other methods of dyke protection, classed roughly under three headings.

Ancient Chinese Conservancy Methods Versus Modern Ones

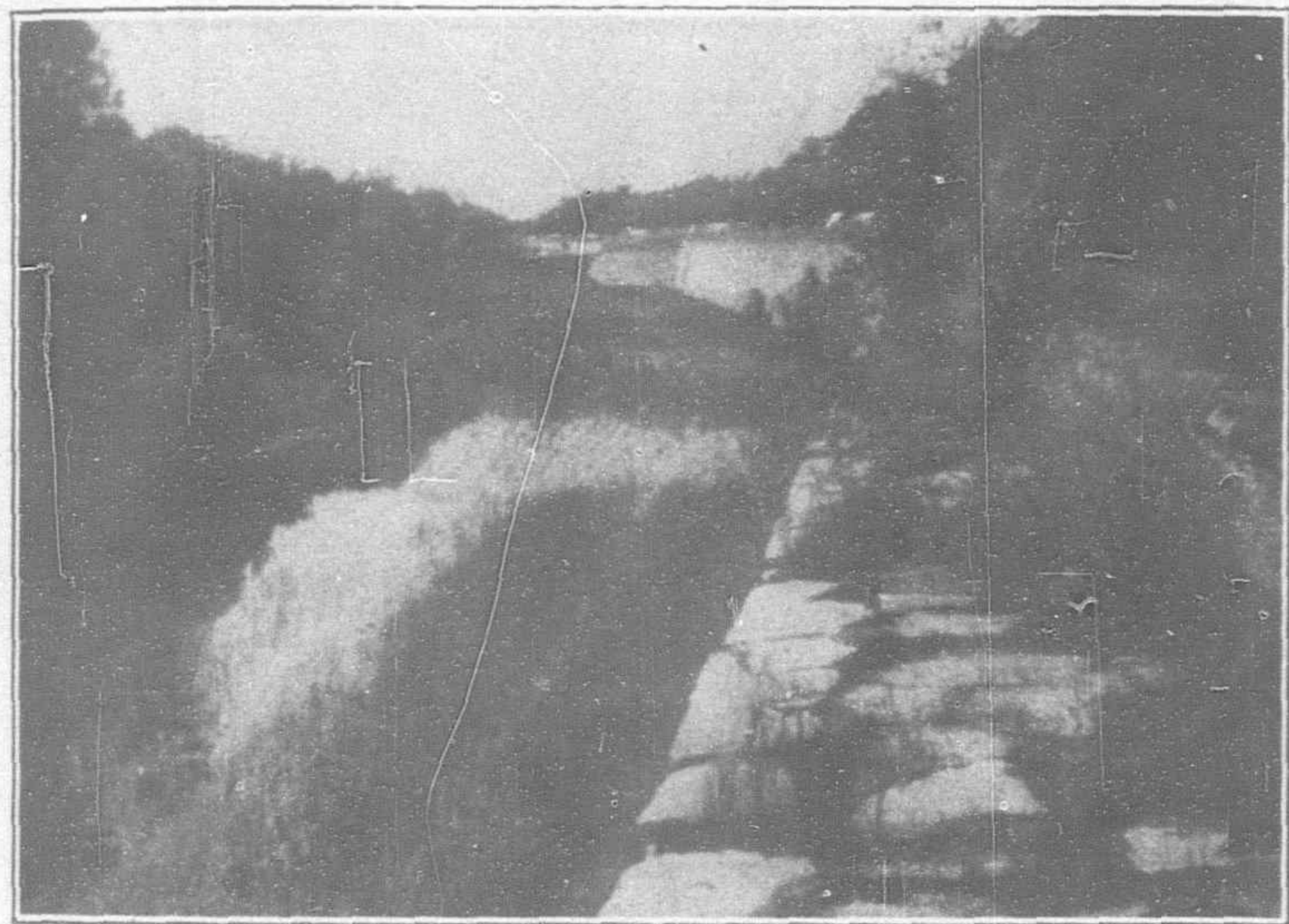
CHIEN LUNG'S DYKES STILL STANDING



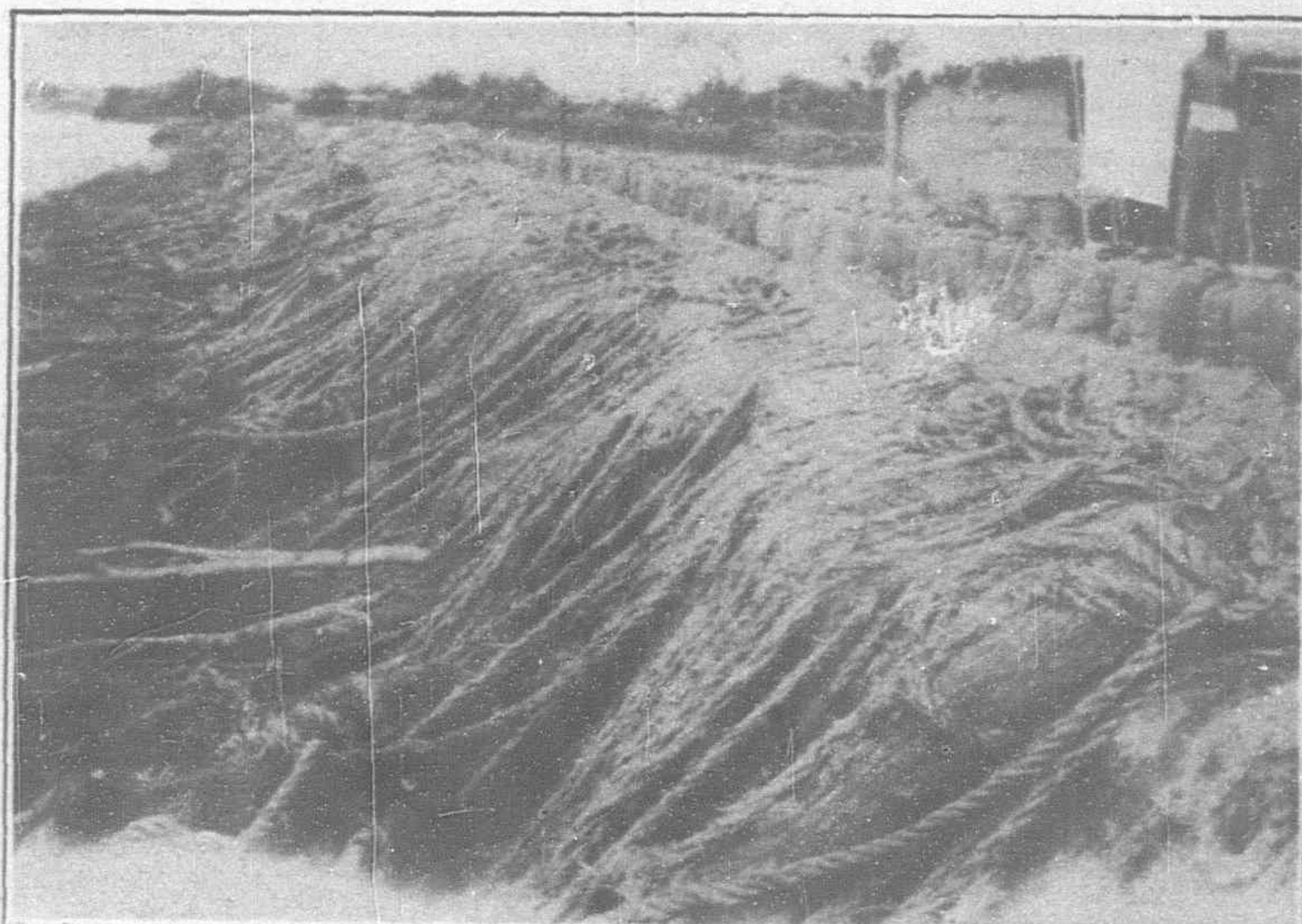
The River Dyke near Lukouchiao Showing Substantial Work of Bygone Days



Top of Lukouchiao Dyke Covered with Cement Work and Faced with Stone



Dyke on North Bank Dating from Chien Lung's Time—It has withstood many Floods



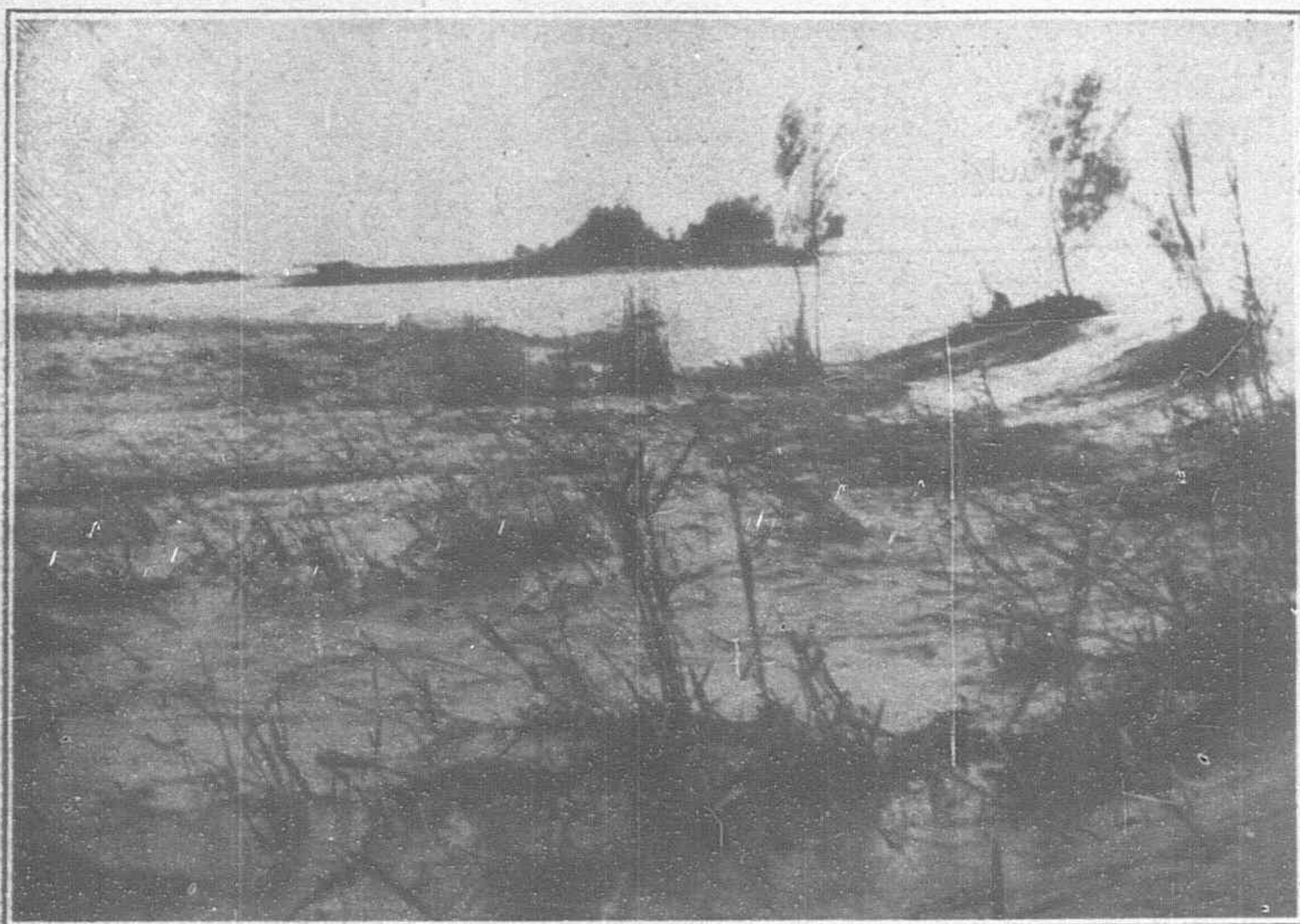
Emergency Protection of Modern Dyke Consisting of Trees Tied with Straw Rope



Dyke North of Tientsin which Barely withstood the Flood now Receding



Tree Protection Work on North Dyke Intended to Cause Deposition of Silt



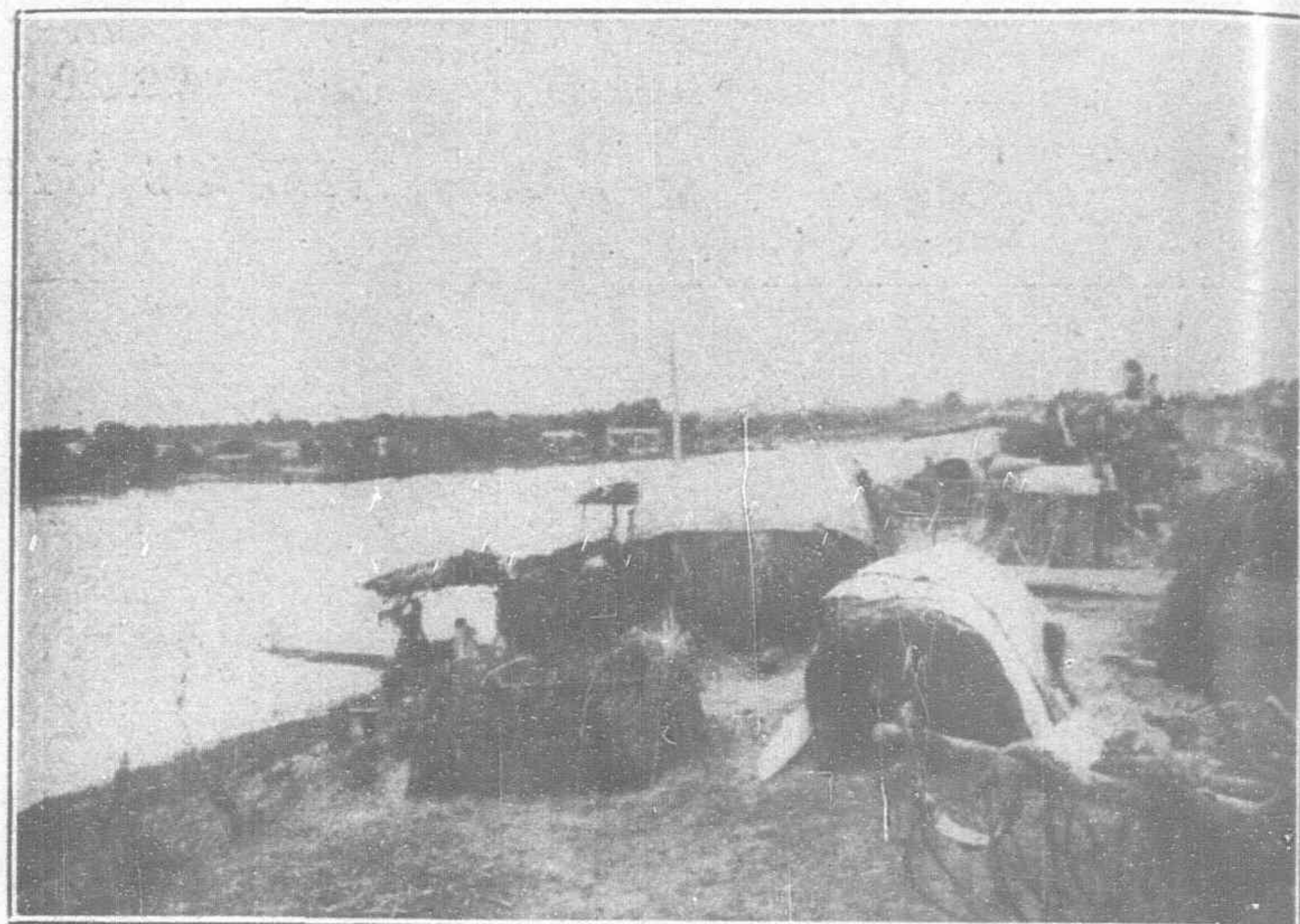
River Pouring Through Breach in Dyke, Other Side of which is Half Mile Away

In some places bundles of kaoliang stalks are laid five or six feet deep pegged down with wooden spikes, with a layer of earth on top, the process being repeated as often as is judged necessary, the whole construction being finally secured by driving twenty to thirty foot wooden piles through the mass. The second practice is to cut down small willow trees or large branches and to anchor these by means of straw ropes to their stems so that the whole mass is suspended over the face of the dyke with the lower end in the water. This causes an eddy, and the consequent retardation of the current causes deposition of the sand held in suspension, so that the river becomes its own dyke builder. The writer has observed several instances where this practice has had very good results, causing quite a marked sandbank to appear within a few days. Thirdly, there is the use of sandbags, which although practised in conservancy work abroad to some extent is usually only regarded as a temporary measure, serviceable in maintaining a dyke against any sudden threat but not forming a permanent surface unless cement be employed, this latter practice leading to expense which is hardly commensurate with the results to be obtained.

It is regrettable that more attention is not paid to the planting of willows on the banks of Chinese rivers, for they grow well, and thereby become a most valuable source of material available in an emergency, while their roots serve to bind the bank firmly. While on the question of materials it may not be out of place to give a few of the prices charged on the work executed by the board, though it should be noted that the figures are for 1923 and that the general rise in costs throughout China has doubtless affected this also.

Kaoliang Stalk

bundles .. 14'0" by 14'0" by 5'0"=9.80
fong* \$7.00 plus \$1.00 transport



Behind the Dyke where the River Has Formed a New Channel Making Islands of the Villages

Piles ..	.. 35'0" by 3" top diam. and butt...	\$4.00	} each
	30'0"	\$3.20	
	25'0"	\$2.50	
Ropes, straw or reed ..	.. 200 pieces 60'0", 24 catties each..	\$36.00	
Stone ..	.. 5-in. stones, not including transportation	\$2.00 a fong	
	Broken stone, 2½ fong within 7 li of quarry, add 50 cents per li transport beyond this..	\$8.00	
	Rock slabs, 10'0" by 1'0" by 6'	\$4.80	
Pile driving ..	30.0 at 8 man days	320-800 coppers	
	25.0 at 6 man days	240-600 coppers	
Earth work ..	100-ft. carry, per fong	30 cents	
	50-ft. carry, per fong	25 cents	

Turning from materials to labor costs and salary lists, the figures given for the preceding year were as follows :

	Staff Salaries	Permanent Labor Wages
Upper southern division (five sections)	\$700.00	\$400.00
Upper northern division	640.00	374.00
Lower southern division	624.00	475.00
Lower northern division	624.00	326.00
Monthly total	\$2,588.00	\$1,575.00

*Fong equals 100 cubic feet.



Refugees on High Spot in Dyke—Thousands of Others were Drowned in the Floods



One of Dykes that Narrowly Escaped—Flood had Barely Topped it when Waters Began to Recede

To this must be added the head office charges of: Salaries \$1,158; wages, 70; telephone, 117; soldiers, 248; sundries, 80; a monthly total of \$1,673.

This can be checked against an account inspected by the writer for the expenses on northern upper division section 2 for the period July 11-25, 1924, which read as follows:

Employed approximately 19,986 men-days at one hundred coppers per day, \$8.947; purchase of trees, 274; branches and straw, 479; transportation of materials, 451; earth filling on dyke, 147; soldiers' expenses, 391; tools, 495; cups, plates, etc., for workmen, 171; stationery, 17; lighting, 60; rewards for good work in emergency, 28; outside supervision in temporary emergency, 62; office food supplies, 230; tea and paper, etc, 74; fodder, 47; rent, 17; totalling in all \$11,890.

To this can be added the following charges for the permanent staff: Engineer, \$50; assistant, 12; miscellaneous, 42; Total, \$104, a month with foremen's wages \$3 plus 10 cents a day for food and permanent workers wages of 1.40-1.60 plus 10 cents a day, or some \$235 a month in all.

If this is taken as a fair example of section wages costs and therefore multiplied by five it will be seen that it is about the same as the divisional costs for preceding years, with the addition of 10 cents a day food allowance. The expense account is a peculiar document however, a one which would puzzle most engineers used to an audit of their accounts. The workmen's is higher than would be paid to any kind of coolie in the neighboring city of Peking within the memory of the writer, being \$13 a month as opposed to the usual \$8 to \$10 a month. The question of the purchase of trees is open to discussion, as those growing on or within 100-ft. of the embankment belong to the government and would presumably not be charged for, while the transportation on the remainder should hardly amount to \$451. There is also a curious expenditure of \$391 on soldiers that calls for an accounting as it is an item that does not as a rule enter into modern engineering practice even in China. Again, if a monthly charge of \$495 were to be made for tools one would imagine that a fine equipment might shortly be got together, if each section were to purchase on the same ratio. Finally one may note with interest the item of \$74 on tea in a period of a fortnight.

It is regrettable that such a state of things should prevail on such an important site, for if the dyke at B should break it would first flood the Peking-Mukden railway and then seriously threaten the southern portion of Peking itself, the resultant damage being incalculable. If a series of permeable dykes were placed above the threatened spot it is more than probable that the ensuing deposition of silt would avert the danger and enable a fresh facing of the old embankment. This was the remedy recommended by the writer two years ago to safeguard a weak spot on the south bank of the river, but apparently nothing was done in the matter. The result was that the dyke gave way at three points this year and the Yung Ting has diverted its course southwards towards Paotingfu, leaving destruction and ruin in its wake.

The map shows the breaks occurred about two miles below the other danger point at B. The river was thrown back from the north bank and impinged on the angle to the south with great force. Training dykes might have enabled the embankment to stand the strain of the unusually heavy flood, but such methods of prevention do not appear to enter into the scheme of things on this conservancy board and the result may prove to be far more expensive than the preventive scheme aforesaid. It will be interesting to see what will be done in connection with these breaks, for they total about a mile and a half in length and would cost several hundred thousand dollars to repair. The fact that the old river bed is some ten to fifteen feet above the level of the surrounding country adds considerably to the difficulty of the work.

As a matter of fact it might be an excellent thing if the Yung Ting should find its way south-west across the territory covered by the Ta Ching Ho and eventually cross the Grand Canal and the Tientsin-Pukow railway, thus making a fresh channel for itself to the sea and avoiding Tientsin altogether. Up to the present it has been the combination of the flood waters of the Pei Ho and the Yung Ting Ho that have constituted a menace to that city. As they have their sources in the hills to the north of Peking, they are

usually rising at the same time, so that if the waters of one of them could be thus diverted, the channel at Tientsin would prove amply sufficient to accommodate the other. It is not impossible that this result will be achieved without engineering co-operation, for the extra flood let loose by the break in the Yung Ting dykes has so augmented the waters of the other streams to the south of Tientsin that the Hsi Ho reported to have broken loose also and to be threatening the banks of the Grand Canal itself, the last protection of the Tientsin-Pukow railway.

At the moment it can only be pointed out that the menace to Tientsin has been very grave and might have involved incalculable losses both in property and lives, a grim commentary on the policy of *laissez faire* in by-gone years. To what extent the surrounding country has suffered is as yet unknown, for full reports are not to hand, but the photographs which the writer has been able to obtain indicate that the damage must be very widespread indeed, affecting an area bounded roughly by Peking on the north, Paotingfu on the south and Tientsin and the sea on the east. The grain and forage market is a fair medium for obtaining a rough estimate of the conditions in the countryside, and it is worth noticing that the price of various horse foodstuffs advanced twenty per cent. in a fortnight, in both the Peking and Tientsin markets.

It is regrettable that such a state of things as appears to exist in regard to this conservancy work on the Yung Ting Ho should be allowed to continue, for while the area controlled by the Chihli River commission is being surveyed and improved every year as far as funds will permit, the flood threat to Peking and Tientsin grows increasingly great as a result of the vagaries of the Chinese conservancy board for the Yung Ting Ho. The help which has been afforded to them in the past by the China international famine relief commission is thereby wasted. Two years ago it was a matter of a loan of \$40,000 which was expended regardless of the advice given by foreign engineers who visited the spot, last year \$60,000 was put into the dykes under the board's control, while in 1924, request has been made for another loan of \$40,000. One foreign engineer who examined the expenditures stated to have been made valued them at \$5,000, and estimated the proposed further construction work at another \$10,000; while the writer himself made a trip of inspection and reported that the outlay in his opinion could not have exceeded \$15,000 for the season as against the desired \$40,000, a result which tallies with the figures quoted by the other engineer inspecting the work.

It is a thousand pities that there is not a greater force of public opinion in China to-day, for if the people who paid for these mis-managements only realized the state of affairs and apprehended that the loans which they were bled while to repay were either only half expended on the purposes for which they were intended or else frittered away on useless and impracticable repairs with no system behind them they would make a clean sweep of the organization which was responsible for their sufferings. It is a disgrace to China that year after year some two or three hundred thousand dollars should be thus wasted on the Yung Ting Ho, when a rational scheme of afforestation and conservancy would enable the danger from the river to be overcome, and render it one of the most fertile sources of irrigation in North China.

An Improved Ship's Telephone

The commonwealth steamer *Fordsdale* is equipped with a new type of automatically controlled speaking apparatus, which is the invention of Mr. H. E. Bingham, a Sydney electrical engineer. Designed on similar though improved lines to an appliance known as the "Autophone," the device is termed the "Binghamphone," and is installed on the bridge, being connected with the crow's nest, steering compartment, fore-castle, engine-room, and docking bridge, thus making conversation between persons stationed at any of the points possible under all conditions. Formally it was at times a difficult matter for members of the crew to make themselves heard above the noise of the engines, but it is claimed that all that is heard through the "Binghamphone" is the speaker's voice.

Possibilities of China Raw Silk

"By the elimination of silkworm diseases, and without increasing the present mulberry production of leaves, China's raw silk production can be increased 400 per cent.," said Mr. Charles J. Huber, Eastern manager of the United States Silk Testing Company, in speaking to the Shanghai Rotary Club recently. "The effect on filature operations in producing raw silk from cocoons reared from disease-free eggs is still more astounding. The cost of production is lower because the various operations involved, such as sorting, peeling and reeling, are simplified. To produce one picul of raw silk at present requires six piculs of dry cocoons, while with good cocoons this quantity can be reduced to four, which even then is more than the average used in Japan."

There are a number of organizations and schools in China now producing disease-free eggs. The most prominent organization in the Shanghai district, said Mr. Huber, is the international committee for the improvement of sericulture in China. This organization has seven egg-producing stations, and produces over 1,000,000 disease-free layings annually, besides purchasing several million layings in Europe for distribution. This committee receives an annual grant from the government, which enables it to carry on and expand its work.

The Chefoo silk improvement commission is doing much work along the same line, but with the wild, or oak-fed, silkworm which produces tussah silk, the silk used in manufacturing pongee goods.

Both Nanking University and Canton Christian College are producing disease-free eggs on a large quantity basis. Yet with all this work on the production of disease-free eggs, only about one-tenth of one per cent. are produced to meet requirements in China. Before the silkworm disease can be controlled, egg production will have to be developed on a commercial scale, as it is in other countries where silk is produced along modern lines.—*Economic Bulletin.*

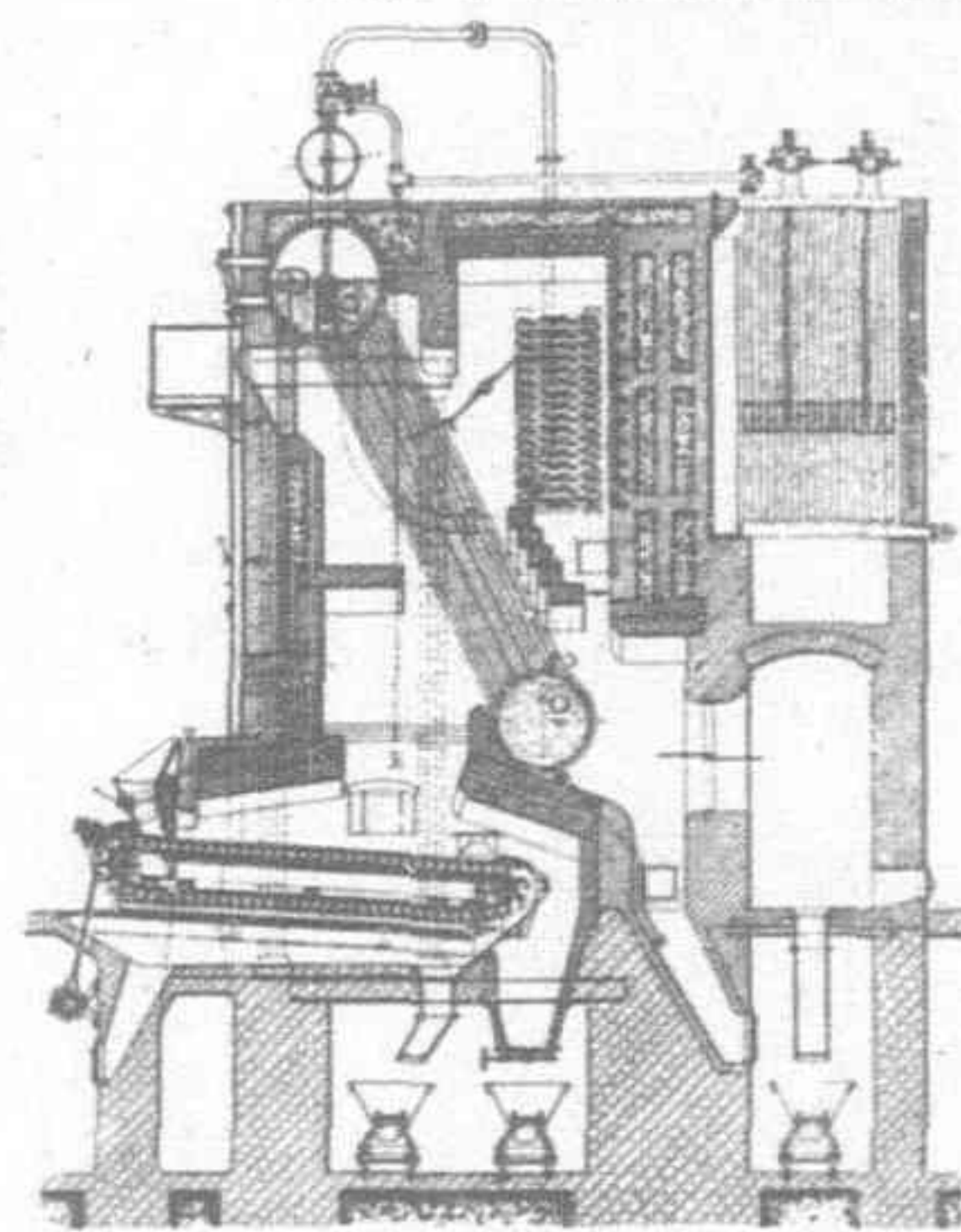
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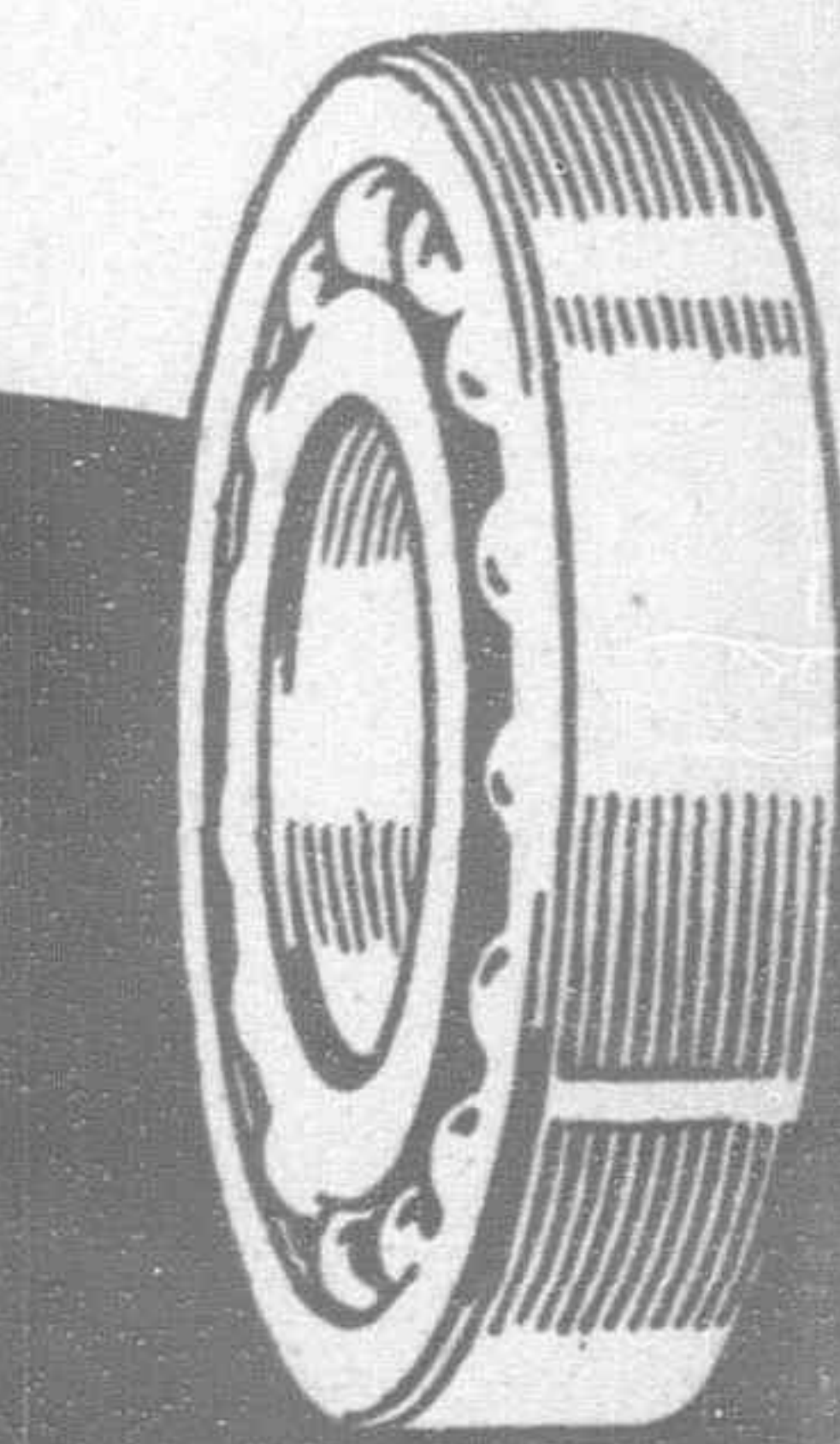
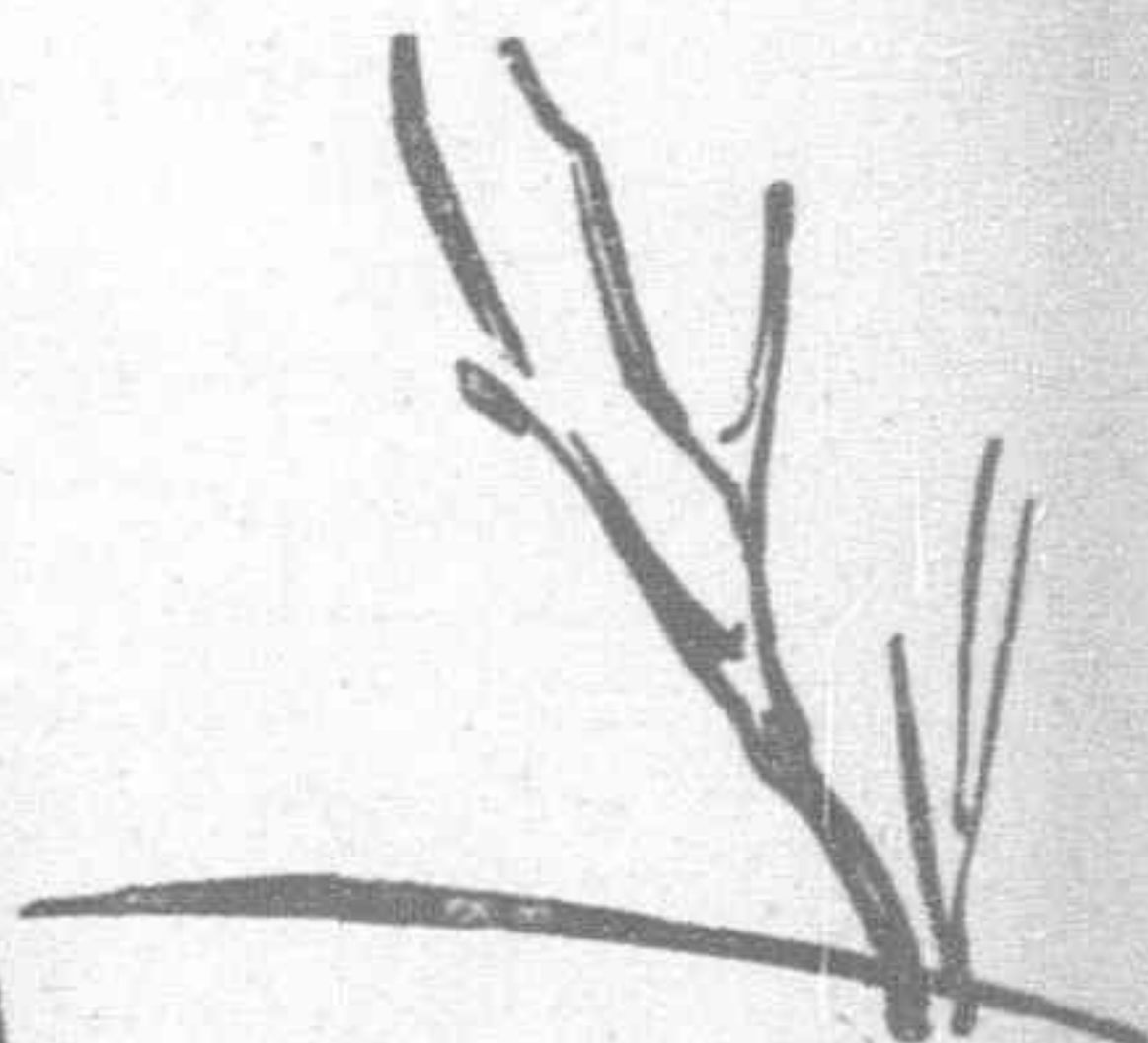
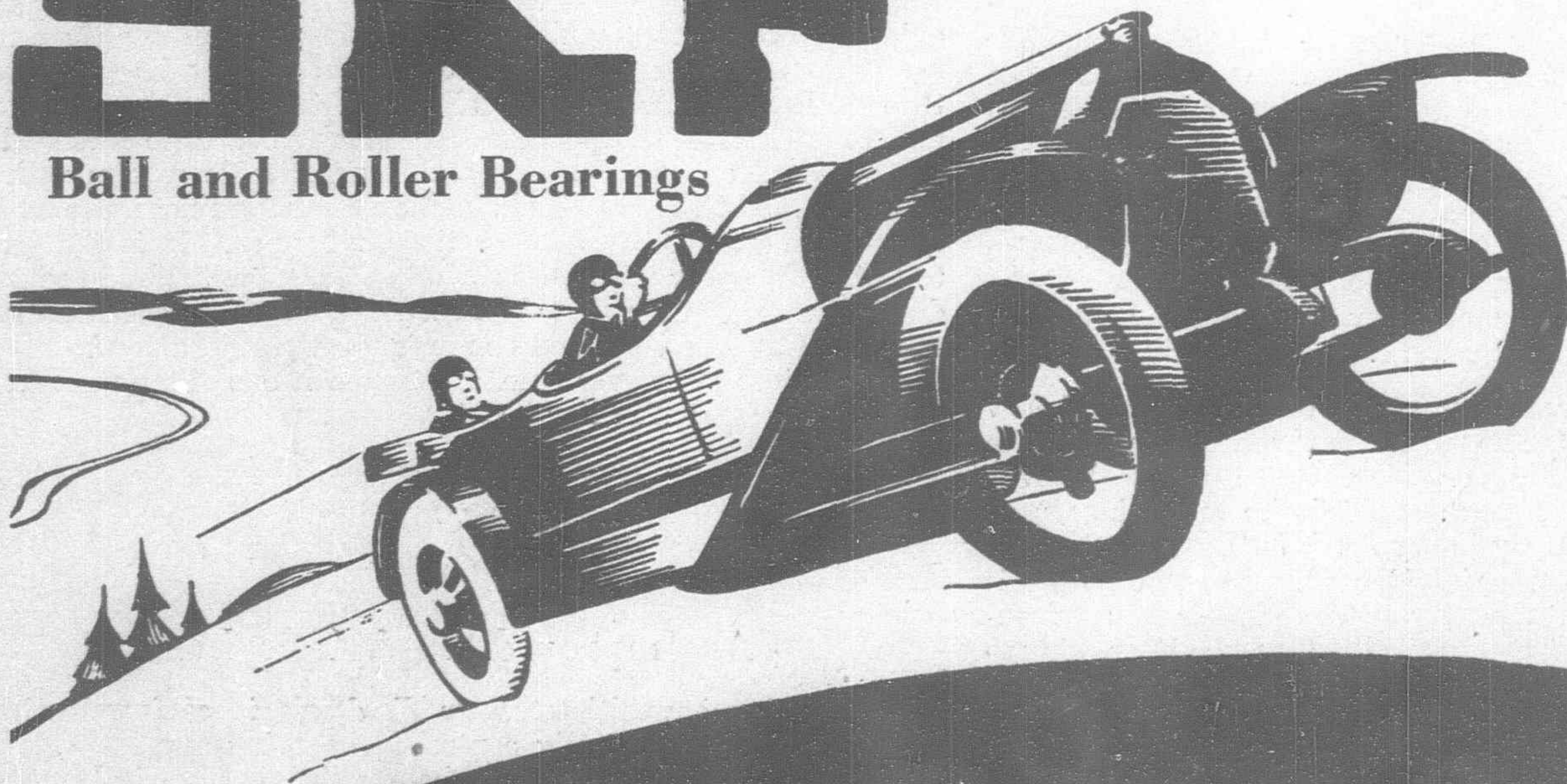
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